RAFNA INDUSTRIES LIMITED

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MODEL R-250 HD
"CUSHION-RIDE" RAILGEAR
OPERATING, SERVICE AND
PARTS MANUAL

"ROTATING FRONT - ROTATING REAR"

READ THIS MANUAL BEFORE OPERATING RAILGEAR EQUIPPED VEHICLE

Railgear Model: CR-250HD-055

Application Models: 2001 GMC 2500HD (All Models *25***HD)

Issued July 2001 Bulletin MO25RRG

Note:

The appendix of this manual includes the latest changes to the installation and operation of the railgear not included in the "body" of this manual.

Please refer to the appendix prior to installing and operating the railgear.

The information in the appendix supersedes whatever is mentioned in the "body" of this manual.

TABLE OF CONTENTS

SECTION 1: GENERAL INFORMATION

1.0 SAFETY INFORMATION



WARNING:

- **Read this manual completely before attempting operation of the railgear equipped vehicle.**

- **Before any maintenance or adjustments are performed under the vehicle or railgear, ensure the vehicle engine is turned off and the parking brake is set.**

- **Ensure that positions and functions of all railgear controls are known before attempting operation.**

- **Ensure all body parts and loose clothing are clear of any moving parts of the equipment.**

- **If misalignment of the railgear equipment is indicated, promptly perform the alignment procedure.**

- **Do not operate the railgear equipped vehicle at speeds in excess of 70 km/h (45 MPH) on rail. Rail travel speed should always be in conformance with rail company regulations and should be reduce during inclement weather, passing through road crossings, switches, frogs, bridges and curves of more than 2 degrees. Curves of greater than 20 degrees should be negotiated with extreme caution. Operation of this vehicle at unsafe speeds could result in derailment.**

- **Ensure that the railgear mechanical lock-ups on both the front and rear units are engaged positively before initiating highway or rail travel.**

- **The railgear equipped vehicle has an increased turning radius. Exercise caution when operating as sharp corners may be difficult to negotiate.**

- **The following safety precautions should be taken before vehicle is operated:**

  - ✓ **Visually inspect the railgear prior to use for damaged or worn parts**
  - ✓ **Check for loose wheels and fasteners**
  - ✓ **Check for leaking hydraulic lines and cylinders**
  - ✓ **Check for proper lubrication**



Failure to heed to any of the above mentioned warnings could result in severe bodily injury and equipment damage.

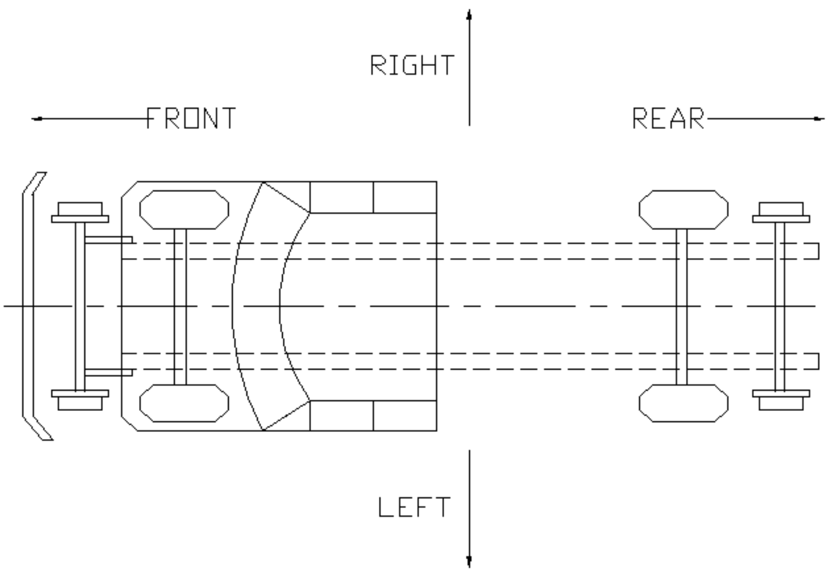
2.0 DESCRIPTION

This manual covers the operation, parts and service of the Rafna Industries rotating front and rotating rear R-250 HD railgear units as applicable to multiple vehicles. If necessary, any difference in operation, parts or service for specific vehicle and/or railgear models is clearly detailed by separate instructions for each. Otherwise, the operation, parts and service instructions are the same for all models. Please refer to the appendix for the latest additions that have not been included in this manual.

The Rafna Industries R-250 HD railgear is a hydraulically operated road-to-rail conversion system applicable to vehicles of up to 12,500 lbs G.V.W.R. The front and rear railgear units are frame mounted systems which are hydraulically raised and lowered. The hydraulic power is supplied by a 12VDC electrical / hydraulic pump. During highway and rail travel, the front and rear railgear units are mechanically locked in position. A steering wheel lock system keeps the vehicle's front wheels straight during rail travel. The railgear's spring suspension system ensures constant wheel to rail contact and a comfortable ride. On-rail propulsion is provided by the vehicle's rear tires' contact with the rail. On-rail braking is accomplished through the vehicle's original braking system.

This manual uses the orientation convention for the vehicle as shown in figure 1-1.

FIGURE 1–1: ORIENTATION CONVENTION



3.0 WARRANTY

RAFNA INDUSTRIES LTD., LIMITED WARRANTY

Rafna Industries' warranty covers a period of TWELVE (12) months after the date of the rail gear's entry into service. The warranty asserts that each new rail gear sold will be free from defects in material and workmanship under normal use and service. Rafna's obligation under this warranty is limited to repairing or replacing at its factory, or other locations as designated by the company. Any defective part or parts must be returned within 30 days of the date of failure or notice of defect for factory inspection or as designated by Rafna Industries Ltd.

Equipment or parts not manufactured by Rafna Industries, but which are furnished in connection with Rafna products are covered directly and solely by the warranty of the original equipment manufacturer supplying them.

The obligation of Rafna Industries under this warranty is limited to the replacement of parts that appear to be defective after review and inspection by our firm or designated representative. This warranty does not oblige Rafna Industries to bear the customer's cost of labor or transportation charges concerning the return of defective parts. However, if found to be defective the outbound direct ground freight on the part will be prepaid to locations within continental United States and Canada by Rafna Industries Ltd. The warranty does not cover responsibility for customer's claims arising from abuse, misuse, neglect, or alteration of the rail gear. All claims are subject to inspection of said parts by our firm.

This warranty is in lieu of other warranties, expressed or implied, including any implied warranties of merchantability or fitness for a particular purpose and any liability for special or consequential damages.

PRODUCT IMPROVEMENT LIABILITY DISCLAIMER

Rafna Industries Ltd., reserves the right to make any changes in or improvements on its products without incurring any liability or obligation whatever and without being required to make any corresponding changes or improvements in products previously manufactured or sold.

IMPORTANT NOTICE

This warranty will be considered void if Rafna Industries' Installation instructions or Service and Maintenance schedule is not followed according to the detailed instructions contained in both our Installation Manual and our Operation and Service Manual.

WARRANTY POLICIES AND PROCEDURES FOR INSTALLERS AND CUSTOMERS

Installers & Customer Warranty:

To prevent unnecessary delays or misunderstandings in handling Installers or Customers warranty claims, it is required that all warranty requests be authorized prior to any repairs, modifications or adjustments being started.

Warranty information and authorization can be obtained from Rafna Industries Vice President – Engineering or Customer Service Manager who can be contacted at: 1-888-525-3660.

Rafna's warranty will not apply if the Railgear or any of its components have been modified or replaced without the written consent of the company.

Additional Billing, Installers & Customers:

If, during installation, it is found that incorrect parts have been shipped. Rafna will cover all costs involved in replacing these parts and return of incorrectly shipped parts.

All warranty claims concerning short / incorrect shipment of parts or accessories must be made within 30 days of delivery.

In order to maintain control over extra or additional billing due to incorrect shipments, only the Vice President – Engineering or Customer Service Manager can issue a Purchase Order authorizing replacement parts, shipping or work to be performed by an outside source.

Warranty Claim information and requirements:

Rafna Industries will require the following information at time of claim as well as the a properly filled out **"Warranty Claim Form"** form reference war #1/03.00

Information Required:

1) Customer Purchase Order number.
2) Rafna railgear serial number.
3) Vehicle unit number.
4) Vehicle VIN number.
5) Purchaser of Rafna railgear.
6) Date of purchase.
7) Name of end user.
8) Company requesting warranty claim.
9) Ship to Address.
10) Bill to Address.

On approval of warranty claim, the Installer or Customer will issue a Purchase Order to Rafna Industries Ltd. to cover the defective parts and out bound freight for part values exceeding $50.00 US and $75.00 CDN. Rafna will in turn ship all required parts pre-paid ground direct to the Installer or Customer. On receipt of claimed warranty parts, Rafna or their sub supplier will inspect defective parts and if deemed warranty, a credit will be issued to the Installer or Customer. If claimed warranty parts are not received within 30 days, a credit will not be issued.

Labor Warranty and /or additional labor charges:

Labor or additional labor charges such as travel are not covered by either the Rafna Warranty or any of Rafna's sub-suppliers.

Faulty Railgear Installations:

If a warranty claim arises due to incorrect installation by an installer who has not followed the written instructions as out lined in our manual or as trained by either Rafna Customer Service or Sales Department, warranty claims will not be honored.

Parts Warranty:

Rafna manufactured parts will be warranted and replaced if found to be defective due to poor materials or workmanship for up to one year from date of the railgear's entry into service. Parts not manufactured by Rafna Industries Ltd., will be covered by the Original Equipment Manufactures warranty. Based on the OEM's investigation of the warranty claim against their manufactured component their decision will stand.

WARRANTY CLAIM FORM

This form must be completed prior to starting any warranty work Warranty # War01-XXXX

Customer		Date	
Tel/Fax		Railgear S/N	
Vehicle No.		Vehicle VIN	
End User		Date of Purchase	
P.O. Number		Ref #	
Inv. Address		Ship to Address	
Inv. Address		Ship to Address	
Inv. Address		Ship to Address	
Inv. Address		Ship to Address	

Shipping instructions:

Standard Ground	Special Air

Standard 5 day +	Select 3 day	Expedition 2-3 day	Express 2 day

Shipper: Way Bill #

PART No.	QUANTITY	DESCRIPTION

PROBLEM DESCRIPTION

Required Documentation from the Customer (For issuing Credit)

Description of Rafna Parts (Ordered or Used)	Invoice #	Total Claimed $	US/CAD

RAFNA INDUSTRIES approved by: ______________________ DATE: __________

CUSTOMER'S REPRESENTATIVE: ______________________DATE: __________

For Internal Use only:

Engineering	5825	Shipping	5826	Outside Supplier	5821
Manufacturing	5820	Service	5822	Installation	5824
			5823		

4.0 SERIAL NUMBERS

Following receipt of this manual, the serial numbers, model numbers and date of manufacture for both the front and rear railgear units should be recorded below for future reference. This information is located on the identification plates (figure 1-2) mounted on the railgear main frames.

Front Railgear Unit:

Serial Number: ____________________

Model Number: ____________________

Date of Manufacture: ____________________

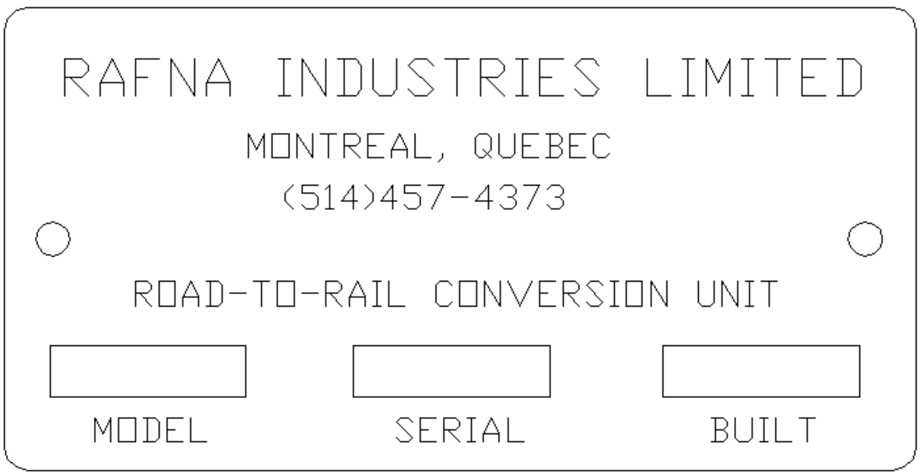
Rear Railgear Unit:

Serial Number: ____________________

Model Number: ____________________

Date of Manufacture: ____________________

FIGURE 1-2: IDENTIFICATION PLATE



5.0 SPECIFICATIONS

Item	Metric	SAE
Installed Weight…...……………………………………...	281 Kg	630 lbs
Maximum Vehicle Load Rating………………………….	5680 Kg	12,500 lbs
Track Gauge……………………………………………...	1435 mm	56 ½ in
Wheel Diameter…………………………………………..	245 mm	10 in

SECTION 2: OPERATION

1.0 INSPECTIONS BEFORE OPERATION

Prior to each use of the railgear equipment, the following items should be inspected:

- ✓ Check for damaged or worn parts
- ✓ Check for loose wheels and/or fasteners
- ✓ Check for leaking or damaged hydraulic lines, fittings, and cylinders
- ✓ Check for proper lubrication at specified intervals

Also, the operator should ensure that the vehicle is in good operating condition by following the vehicle manufacturer's operating guide.



WARNING:

Following the first eight (8) hours of rail travel, an initial wheel bearing inspection and verification of sufficient wheel bearing grease should be performed. During this time period, the wheel bearings will have seated themselves and may require adjustment of end-play. If the end-play is not in accordance with specifications of 0.005", bearing failure could occur and would not be covered under the Rafna Industries Warranty. Refer to the Service section of this manual for wheel bearing adjustment procedures.

Following the first 1000 km (625 Miles) of highway and rail travel, the vehicle offset rim and wheel spacer retaining nuts should be re-torqued. Refer to the Service section of this manual for re-torquing procedures.

On newly applied railgear equipment, ensure that the railgear and guide wheel alignment procedure is performed before operation of the equipment. Note that excessively worn guide wheels, vehicle pulling to one side while on the rail, and vibrations through the vehicle while on the rail are indicators of misaligned railgear or guide wheels. If any of these situations are encountered, proceed to perform the alignment procedure as described in the Service section of this manual as soon as possible to avoid damage to the equipment and vehicle.

2.0 PLACING VEHICLE ON THE TRACK



WARNING:

- **Operating instruction provided below only address the Rafna Industries railgear equipment. Applicable railway company procedures and policies must be adhered to.**
- **At level rail crossings, ensure that no other vehicles are approaching and flag the crossing to ensure safety.**
- **Understand equipment operation before operating equipment.**

1. At a suitable location, drive the vehicle past the rail crossing and reverse onto and parallel to the rails while aligning the rear railgear unit guide wheels directly over the rails. At this point the front railgear unit guide wheels should be somewhat aligned over the rails.

2. Place the vehicle automatic transmission in “PARK” (manual transmission in “NEUTRAL”) and apply the parking brake. Energize the Railgear Pump by turning on the respective dash switch. The dash switch light should come on at this point but the railgear pump should not run yet. The railgear pump is an intermittent duty pump which will only run while activating the front or rear push button controls.

3. Note that in order to align the front railgear guide wheels directly over the rails, the rear railgear must be deployed first, then the vehicle is reversed until the front is aligned.

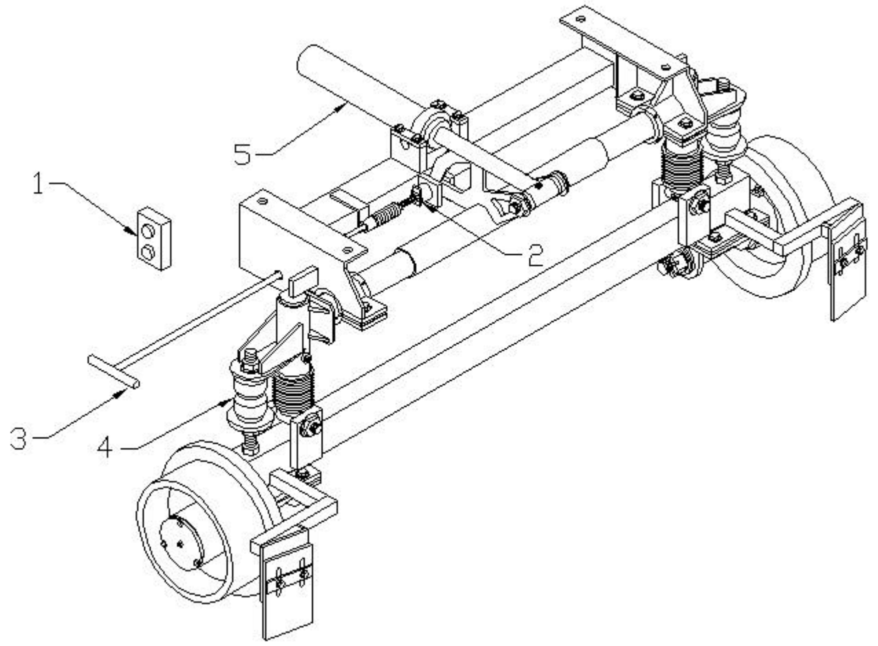
4. The direction of hydraulic flow to the front and rear railgear is selected by pushing the respective control box “Raise” or “Lower” push buttons. This energizes the front or rear hydraulic solenoid valve and starts the pump motor.

5. Lower the rear railgear unit: (refer to figure 2-1)

   a) Raise the railgear out of the mechanical locking system by selecting “Raise” on the rear control (1).
   b) Disengage the mechanical locking pin (2) by pulling the locking cable handle (3).
   c) While holding the locking cable handle in this position, lower the railgear by selecting “Lower” on the rear control.
   d) Release the locking cable handle once the railgear has rotated below the highway locked position.
   e) Note that while the railgear is taking some of the vehicle’s load, the railgear suspension (4) should be observed compressing. With the vehicle unloaded, the nuts above the springs should be about 1” above the spring plate once the railgear is fully deployed. If this is not the case, check for adequate lubrication. If the inner tubes are not free to move, the spring suspension will not work correctly.

f) Continue lowering the railgear until the hydraulic cylinder (5) is fully extended and the mechanical locking pin clicks into the rail locked position. In this position, the railgear should be about vertical.
g) Release the rear control.
h) Ensure that the rear railgear is securely locked in position and correctly contacts the rails before proceeding.

FIGURE 2–1: ROTATING REAR RAILGEAR OPERATION



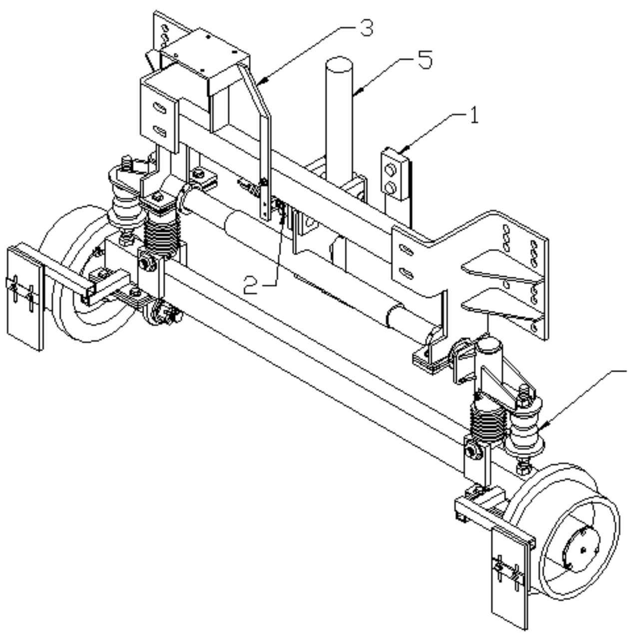
6. Lower the front railgear unit: (refer to figure 2-2)

a) With the rear railgear unit correctly deployed onto the rails, reverse the vehicle until the front railgear guide wheels are directly over the rails.
b) Place the vehicle's automatic transmission in "PARK" (manual transmission in "NEUTRAL"), apply the parking brake, and re-energize the Railgear Pump if required by turning on the respective dash switch.
c) Raise the railgear out of the mechanical locking system by selecting "Raise" on the front control (1).
d) Release the mechanical locking pin (2) from the highway locked position by moving the locking handle (3) towards the left side of the vehicle. Hold the locking handle in this position.
e) Lower the railgear by selecting "Lower" on the front control.
f) Release the locking handle once the railgear has rotated below the highway locked position.
g) Note that while the railgear is taking some of the vehicle's load, the railgear suspension (4) should be observed compressing. With the vehicle unloaded, the nuts above the springs should be about 1" above the spring plate once the railgear

is fully deployed. If this is not the case, check for adequate lubrication. If the inner tubes are not free to move, the spring suspension will not work correctly.

h) The railgear moves down into position on the rails until the hydraulic cylinder (5) is fully extended and the mechanical locking pin clicks the into rail locked position. In this position, the railgear should be about vertical.
i) Release the front control.
j) Ensure that the railgear is securely locked in position and correctly contacts the rails before proceeding.

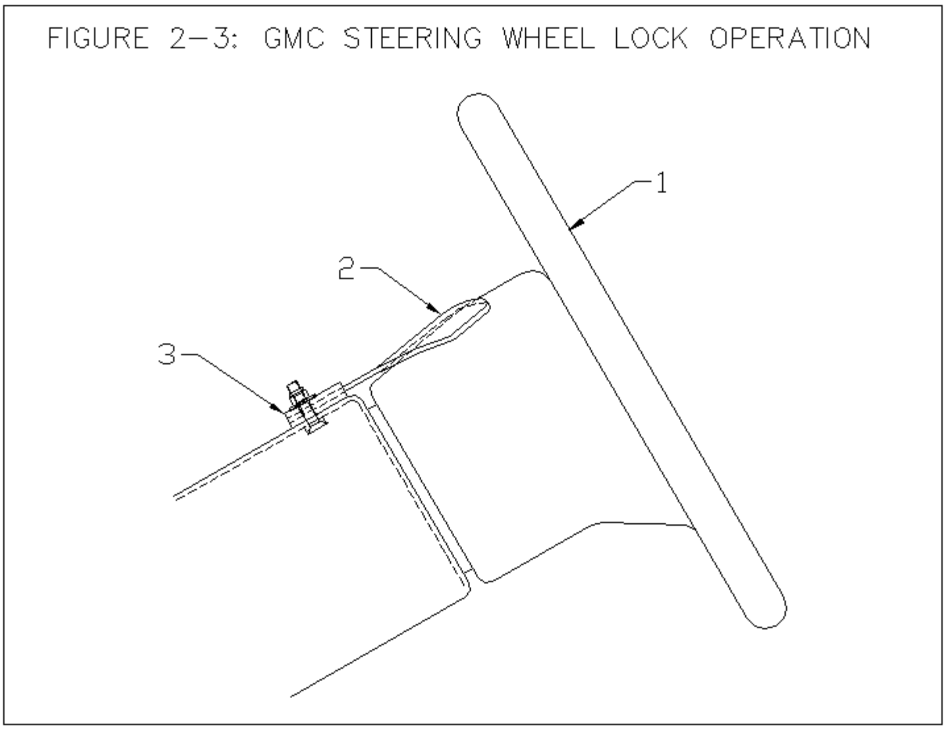
FIGURE 2-2: ROTATING FRONT RAILGEAR OPERATION



7. De-energize the Railgear Pump by turning off the respective dash switch.

8. Engage the steering wheel lock system: (refer to figure 2-3)

   a) Turn the steering wheel (1) until the front tires point straight ahead.
   b) Pass the steering lock (2) over the horn cover and into the steering column lock retainer (3).
   c) Ensure the steering lock secures the steering wheel and does not interfere with the driver's air bag cover.


FIGURE 2-3: GMC STEERING WHEEL LOCK OPERATION
1
2
3

3.0 TRAVELLING ON RAIL

Before proceeding to travel on the rail, ensure that the railgear pump has been de-energized, that the railgear cylinders are fully extended, that the front and rear mechanical locks are securely engaged, and that the steering wheel lock has been installed with the front wheels pointing straight ahead.



WARNING:

- **Do not operate the vehicle in excess of 70 km/hr (45 MPH) on the track. Railroad rules governing on rail travel must be observed at all times.**
- **Do not operate vehicle on track if the vehicle load exceeds the maximum load rating of the railgear.**
- **Do not operate the vehicle on track if the steering wheel lock is not engaged.**
- **Do not operate the vehicle on track if the Railgear Pump is energized.**
- **Do not operate the vehicle on track if the front or rear mechanical locks are not securely engaged**

The vehicle may now be driven as if on the highway at a reduced speed. The steering wheel should not be touched; it should be allowed to float in the steering wheel lock. Note also that braking distance is increased while on the track.

4.0 BRAKING ON RAIL

This railgear equipment allows the vehicles tire contact with the rail to provide the braking action, identically as if on the highway. However, it is important to apply the brakes gradually in order to avoid locking up the vehicle tires. Note also that stopping distance while on the track is greater than when on the highway and braking ability can be adversely effected during inclement weather.

5.0 REMOVING VEHICLE FROM THE TRACK



WARNING:

- **Operating instruction provided below only address the Rafna Industries railgear equipment. Applicable railway company procedures and policies must be adhered to.**

- **At level rail crossings, ensure that no other vehicles are approaching and flag the crossing to ensure safety.**

- **Understand equipment operation before operating equipment.**

1. Approach a level crossing or other suitable location, and prepare to remove the vehicle from the track by placing the automatic transmission in “PARK” (manual transmission in “NEUTRAL”) and applying the parking brake.

2. Energize the Railgear Pump by turning on the respective dash switch. The dash switch light should come on at this point but the railgear pump should not run yet. The railgear pump is an intermittent duty pump which will only run while activating the front or rear push button controls.

3. Note that the vehicle is removed from the track by first raising the front railgear and then raising the rear railgear. Finally the steering wheel lock is removed.

4. The direction of hydraulic flow to the front and rear railgear is selected by pushing the respective control box “Raise” or “Lower” push button. This energizes the front or rear hydraulic solenoid valve and starts the pump motor.

5. Raise the front railgear unit: (refer to figure 2-2)

   a) Disengage the mechanical locking pin (2) by moving and holding the locking handle (3) to the left side of the vehicle. It may be necessary to lower the railgear slightly in order to release the pressure on the locking pin.
   b) Raise the railgear unit by selecting “Raise” on the front control (1).
   c) Release the locking handle once the railgear has rotated past the rail locked position.
   d) Continue raising the railgear unit until the mechanical locking pin clicks into the highway locked position (the hydraulic cylinder will be retracted).
   e) Release the hydraulic pressure in the cylinder by selecting “Lower” on the front control. The railgear should rest on the locking pin.
   f) Ensure the mechanical locking pin is correctly engaged before proceeding.

6. Raise the rear railgear unit: (refer to figure 2-1)

   a) Disengage the mechanical locking pin (2) by moving and holding the locking cable handle (3) to the left side of the vehicle. It may be necessary to lower the railgear slightly in order to release the pressure on the locking pin.
   b) Raise the railgear unit by selecting "Raise" on the rear control (1).
   c) Release the locking cable handle once the railgear has rotated past the rail locked position.
   d) Continue raising the railgear unit until the mechanical locking pin clicks into the highway locked position (the hydraulic cylinder will be completely retracted).
   e) Release the hydraulic pressure in the cylinder by selecting "Lower" on the rear control. The railgear should rest on the locking pin.
   f) Ensure the mechanical locking pin is correctly engaged before proceeding.

7. De-energize the Railgear Pump by turning off the respective dash switch.

8. Disengage the steering wheel lock: (refer to figure 2-3)

   a) Pull the steering lock (2) out of the lock retainer (3).
   b) Store the steering lock in a secure spot.



WARNING:

- **Before proceeding with highway travel, ensure both the front and rear railgear units are securely seated in their respective mechanical locking systems.**

- **Ensure that the railgear pump has been de-energized.**

9. Carefully drive the vehicle off the track and onto the highway.

SECTION 3: SERVICE

1.0 RAILGEAR ALIGNMENT

This railgear equipment must be correctly aligned in order to perform properly and avoid excessive wear on the equipment. All four rail wheels may be independently aligned while lateral adjustment of the front and rear railgear is accomplished through adjusting the railgear on the mounting plates. A parallel line system and the following procedure should be used to perform the railgear alignment. Rafna Industries can also supply a special alignment tool kit (Order 2 x R-066AD and 2 x R-066AP) with which separate instructions are supplied.

WARNING:

- **The vehicle tires should have been aligned following installation of the railgear and prior to performing the railgear alignment.**
- **This procedure should be done with the vehicle parked on straight level track with the front tires pointing straight ahead in order to achieve correct alignment.**
- **Before any maintenance or adjustments are performed under the vehicle or railgear, ensure the engine is turned off and the parking brake is set.**

1. Ensure the vehicle tires have been aligned following the installation of the railgear and prior to performing the railgear alignment.

2. Lower the front and rear railgear units to the rail position on a straight level section of track.

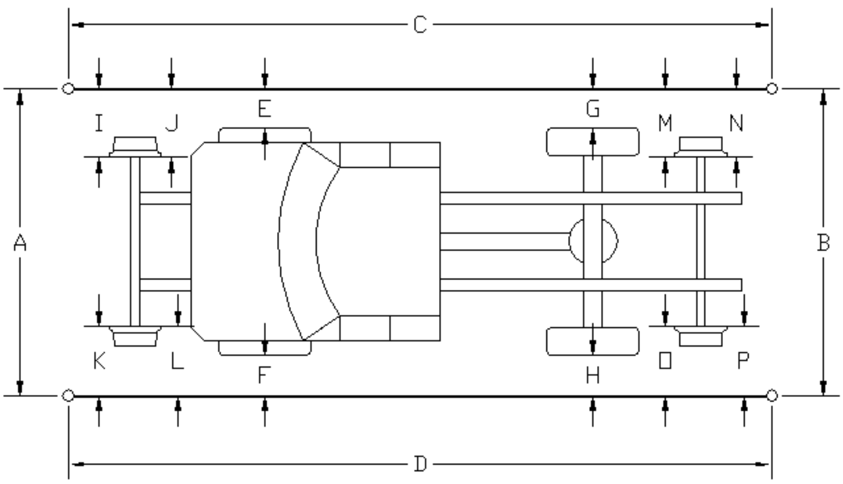
3. Ensure the vehicle front tires are pointing straight ahead and engage the steering lock.

4. Set up a parallel string line system about 6 inches above the head of the rail as follows: (refer to figure 3-1)

   a) Fabricate two metal alignment bars with ½" diameter posts on each end about 7" tall and about 9' apart. Create a circumferencial groove in each post about 1" from the top to hold the string lines. Ensure that the two alignment bars are fabricated identical to within 1/32" tolerance. The location of the posts on the alignment bars will ensure that dimensions A and B are equal.
   b) Fasten the alignment bars to the head of the rail about 2' ahead of and behind the vehicle. Ensure that the alignment bars are perpendicular to the rail and can be slid side to side for adjustment. The location of the alignment bar posts will ensure that dimensions C and D are equal.
   c) Run a string line from the front alignment bar post to the rear alignment bar post on each side of the vehicle using the grooves cut in the posts.
   d) Ensure that dimensions A and B are equal, and dimensions C and D are equal.

5. Proceed to adjust the side to side location of the alignment bars until the distance between each vehicle front rim and each string line is equal (dimensions E and F equal) and the distance between each vehicle rear rim and each string line is equal (dimensions G and H equal). Note that dimensions E and F may not equal dimensions G and H.

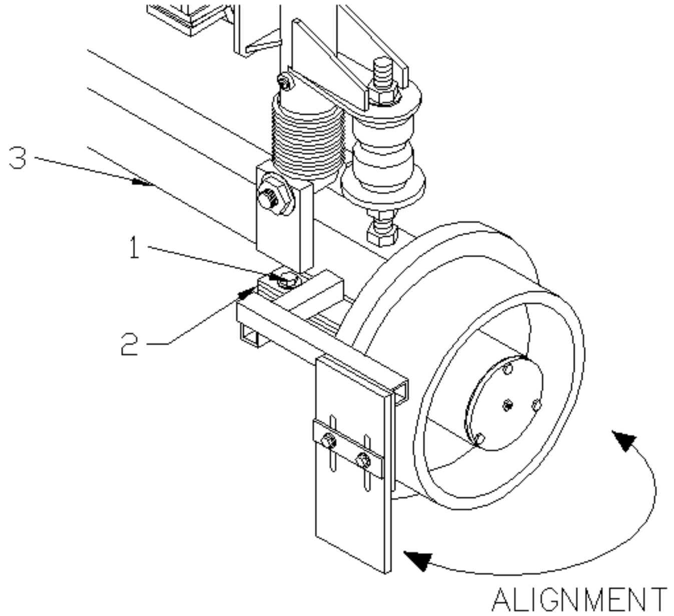
FIGURE 3–1: RAILGEAR ALIGNMENT MEASUREMENTS



6. Railgear wheel alignment:(refer to figure 3-1 and 3-2)

   a) Secure an 18" long straightedge to the backside of each railgear wheel flange.
   b) Measure the distance between the front-most and rear-most points of each straightedge and the parallel lines (dimensions I, J, K, and L in the front and M, N, O, and P in the rear).
   c) With a tolerance of 1/16", dimensions I and J should be equal, dimensions K and L should be equal, dimensions M and N should be equal, and dimensions O and P should be equal. If this is not the case, proceed to adjust the rail wheel alignment. Otherwise, proceed to step 7.
   d) Loosen the four bolts and nuts (1) securing each railgear wheel spindle housing (2) to the railgear axles (3) such that the wheels are free to rotate on the horizontal plane yet snug enough to stay in place.
   e) Adjust each wheel to the centered position (dimension I & J equal, K & L equal, M & N equal, and O & P equal). Note that dimensions I & J may not equal K & L and M & N may not equal O & P at this point.
   f) Re-torque the rail wheel fasteners to specifications.
   g) Remove the straightedges.

FIGURE 3–2 : RAIL WHEEL ALIGNMENT



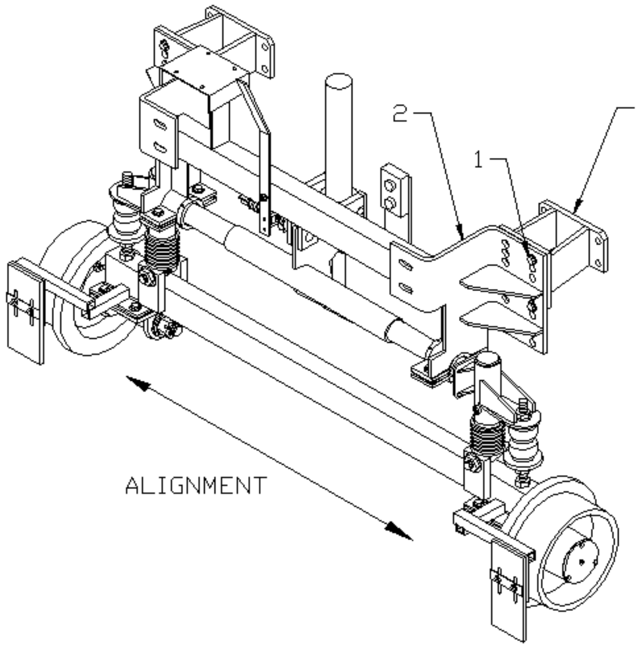
WARNING:

- **When adjusting the lateral alignment of the front and rear railgear, do not use any force against the suspension guide tube assemblies that may cause damage which would restrict the suspension movement of the railgear.**

7. Front railgear lateral alignment: (refer to figure 3-1 and 3-3)

   a) Secure a straightedge to the backside of each front rail wheel flange.
   b) Measure distance from the front-most and rear-most points of the two straightedges to the parallel lines (dimensions I, J, K, and L).
   c) If these measurements are within 1/8" tolerance, proceed to step 8. Otherwise continue to step 7 d).
   d) Raise the railgear off the track and loosen the four bolts (1) that secure the railgear unit (2) to the front mounting plates (3).
   e) Move the railgear unit laterally until dimensions I, J, K, and L are equal to within 1/8" tolerance.
   f) Re-torque the four mounting bolts to specifications.
   g) Remove the two straightedges and lower the railgear to rail position.

FIGURE 3–3: FRONT RAILGEAR LATERAL ALIGNMENT



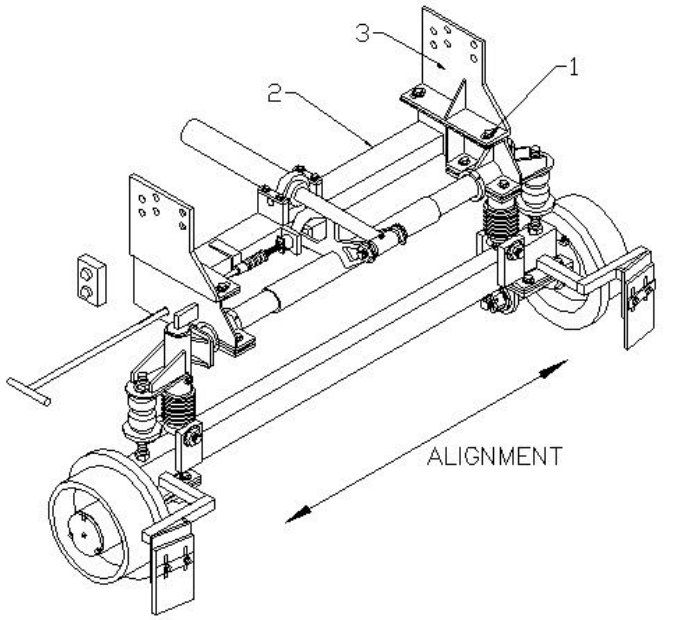
8. Rear railgear lateral alignment: (refer to figure 3-1 and 3-4)

   a) Secure a straightedge to the back side of each rear rail wheel flange.
   b) Measure distance from the front-most and rear-most points of the two straightedges to the parallel lines (dimensions M,N,O,P).
   c) If these measurements are within 1/8" tolerance, proceed to step 9. Otherwise continue to step 8. d).
   d) Raise the railgear off the track and loosen the four bolts (1) that secure the railgear unit (2) to the rear mounting plates (3).
   e) Move the railgear unit laterally until dimensions M,N,O,P are equal to within 1/8" tolerance.
   f) Re-torque the four mounting bolts to specifications.
   g) Remove the two straightedges and lower the railgear to the rail position.

9. Remove the parallel line system

10. Remove the vehicle from the rails.

FIGURE 3–4 : REAR RAILGEAR LATERAL ALIGNMENT



2.0 RAIL WHEEL BEARING ADJUSTMENT

The front and rear railgear wheel bearings will need to be adjusted if the wheel end-play exceeds 0.005”. Recommended end-play range is from 0.003” to 0.004”. If the bearings are not adjusted, bearing failure could occur and this would not be covered under the Rafna Industries Warranty.

If the end-play is not in conformance with this specification, adjust the wheel bearings as follows: (refer to figure 3-5)

WARNING:

- **Before any maintenance or adjustments are performed under the vehicle or railgear, ensure the engine is turned off and the parking brake is set.**

1. Perform this procedure with the railgear in the highway position and with the railgear wheels free to turn.

2. Access the wheel bearings: Remove the wheel hub cap (1) and gasket (2) by unbolting the three hub cap retaining bolts (3).

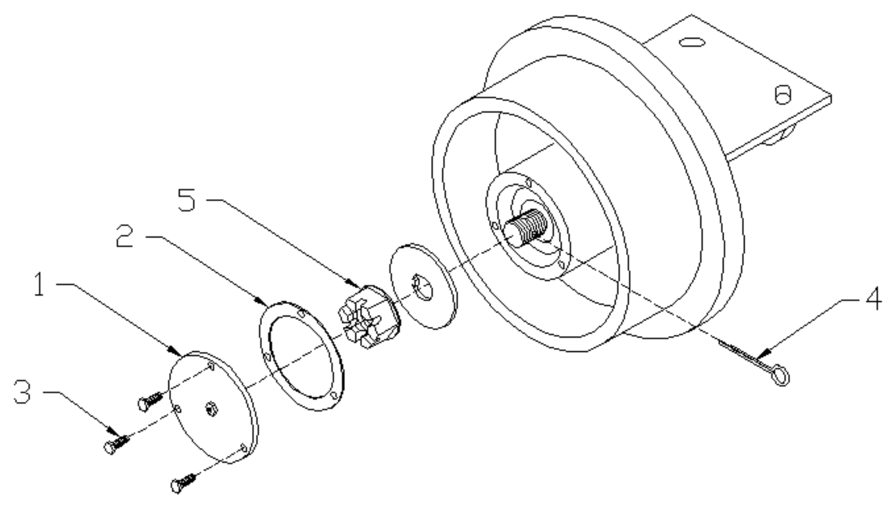
3. Adjust the wheel bearing:

    a) Remove spindle nut cotter pin (4).
    b) While rotating the wheel forward, torque the wheel spindle nut (5) to 20 ft-lbs.
    c) Loosen the spindle nut slightly until it is “just loose”.
    d) Re-torque the spindle nut to 6 ft-lbs.
    e) Install a new cotter pin through the spindle nut and spindle. If the cotter pin holes do not line up, tighten the spindle nut until the holes align. Do not tighten more than ½ flat of the nut.
    f) Ensure there is sufficient grease in the wheel bearing cavity.
    g) Re-install the gasket and hub cap. Torque the hub cap retaining bolts to specifications.

If a torque wrench is not available, the following procedure may be substituted for steps 3. b) through 3. d) above:

a) Tighten the spindle nut until the wheel cannot be turned by hand.
b) Loosen the spindle nut until the wheel can be turned by hand and the cotter pin can be installed.
c) Re-adjust when torque wrench is available.

FIGURE 3–5: RAIL WHEEL BEARING ADJUSTMENT



3.0 RAIL WHEEL LOAD ADJUSTMENT

The percentage of the vehicle load carried by the railgear wheels must be properly adjusted to ensure sufficient traction and guidance and to avoid overloading of the railgear equipment. The load on the rail wheels is an indicator of the amount of load carried by the railgear and is adjusted as described below with a hydraulic bottle jack. This adjustment is done at installation and only requires re-adjustment if the railgear is moved or vehicle equipment is changed. The load need not be adjusted with every minor load change in the vehicle.

WARNING:

- **Before any maintenance or adjustments are performed under the vehicle or railgear, ensure the engine is turned off and the parking brake is set.**
- **The vehicle should not be carrying any load during this procedure.**
- **Ensure an inspection of the railgear units has been carried out before any track testing is performed.**

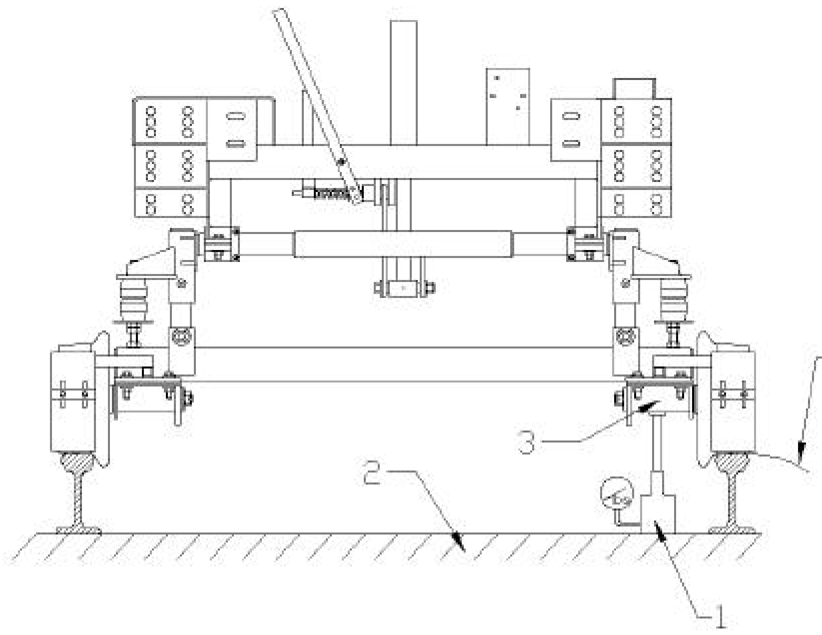
1. Place the vehicle on a level section of rail with the railgear deployed to the rail position.
2. Ensure that the vehicle tires are not in contact with any obstructions except the rails and that they are inflated to the correct air pressure.
3. Check each rail wheel load as follows: (refer to figure 3-6)
   a) Place the jack (1) on a solid railway tie (2) beneath the rail wheel spindle housing (3) and jack the rail wheel off the rail.
   b) Insert a piece of paper (4) between the rail and the rail wheel and lower the jack until the rail wheel squeezes the paper so that it cannot be pulled out.
   c) Slowly jack up the rail wheel while pulling on the paper. When the paper can be pulled out, stop jacking.
   d) Record the weight reading on the jack and compare to the minimum required load in Table 3-1.

Table 3-1: Minimum Required Rail Wheel Load

Front Rail Wheel Load:	700 – 800 lbs
Rear Rail Wheel Load:	450 – 500 lbs

(Note: Different size jacks will show different hydraulic **pressure** readings while lifting identical weights. This manual therefore specifies railwheel **load** in terms of **weight** not pressure.)

FIGURE 3-6: FRONT RAIL WHEEL LOAD MEASUREMENT



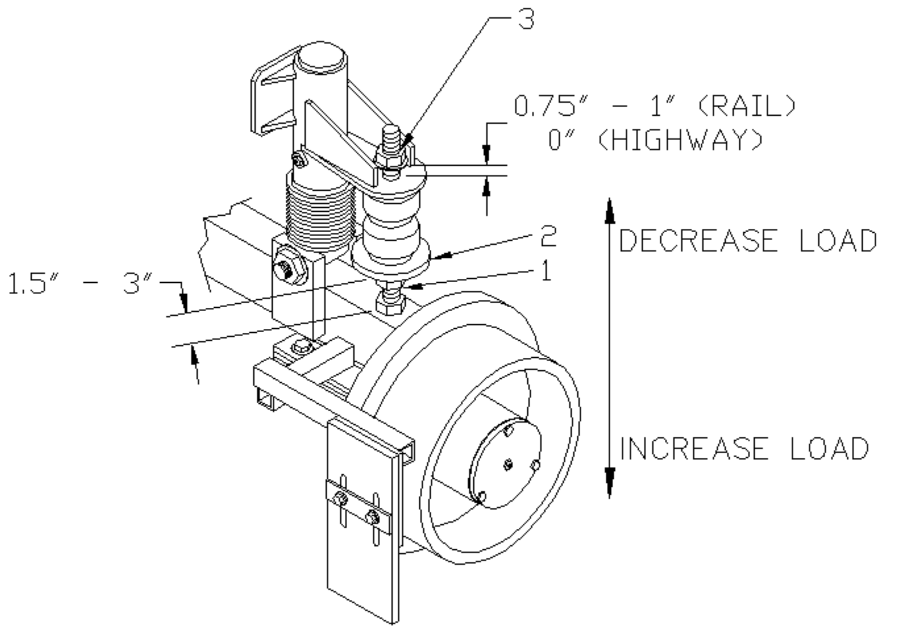
4. If the load on the rail wheels are not within the specifications listed in Table 3-1, adjust as follows: (refer to figure 3-7)

   a) Raise the railgear until the rail wheels are unloaded.
   b) Loosen the jam nuts (1) under each lower spring plate (2) and the upper lock nuts (3) above each upper spring plate.
   c) Adjust the lower spring plates and upper lock nuts up to increase the load or down to decrease the load on the rail wheels. Each side should be moved the same amount.
   d) The acceptable range of adjustment on the lower spring plates is 1½” – 3” from bottom of lower spring plate to the top of axle. If the correct loads cannot be obtained within this range, adjust the height of the railgear in the mounting plate holes.
   e) Lower the railgear and recheck each rail wheel load. Re-adjust if necessary.
   f) Tighten the jam nuts against the lower spring plates.
   g) Raise the railgear and tighten the upper lock nuts until the rubber springs just start to compress. Do not pre-compress the rubber springs.
   h) Lower the railgear to the rail position. The upper lock nut should be about ¾” – 1” above the upper spring plate.
   i) Raise the railgear to the highway position.

WARNING:

- **The rail wheels must be a minimum of 7 ½" above the ground when in the highway position. If this minimum distance cannot be met with the correct rail wheel loads and the holes available in the mounting plates, contact Rafna Industries.**

FIGURE 3–7 : RAIL WHEEL LOAD ADJUSTMENT



4.0 ROUTINE RAILGEAR SERVICE

The front and rear railgear must be serviced to ensure proper operation and avoid damage to the equipment. Refer to table 3-2 for the Recommended Service Schedule.

Grease fittings are provided at all lubrication points on the Rafna Industries railgear and are located in figures 3-8 and 3-9. The recommended lubricant for this equipment is **ESSO LONAX EP2 GREASE** or equivalent (operating range –30°C to 135°C) for all lubrication points. In cold weather areas and/or winter seasons, use low temperature grease such as **SHELL DARINA XL 102**.

Torque truck rim lug nuts to 125 – 165 ft-lbs as per sequence shown in figure 3-10.

Should any loose nuts and bolts be encountered on the railgear during the inspections or during maintenance of the railgear units, first refer to figures 3-11 & 3-12 for non-standard bolt torques and then to table 3-3 for standard bolt torques.



WARNING:

- **If the vehicle should derail, a thorough inspection of the complete railgear assemblies for damaged parts should be carried out before the units are put back into service.**

Table 3-2: Recommended Service Schedule

	Service Required	Daily	Initial 8hr of Use	Weekly	Monthly	Every 3 Months	Every 6 Months
1	Visually inspect the railgear prior to use for damaged or worn parts.	✓		✓	✓	✓	✓
2	Check for loose rail wheels and fasteners.	✓		✓	✓	✓	✓
3	Ensure the rail gear locking mechanism is functioning properly in both the road and rail positions.	✓		✓	✓	✓	✓
4	Check and adjust truck tire pressure as per vehicle specifications.	✓		✓	✓	✓	✓
5	Ensure the vehicle is in good operating condition based on the vehicle operating and maintenance instructions.	✓		✓	✓	✓	✓
6	Check and adjust rail wheel end play (0.005” max.).		✓			✓	✓
7	Inspect railgear wheel flanges for wear. Use the “Rafna Wheel Flange Indicator” for measurement.			✓	✓	✓	✓
8	Inspect all hydraulic fittings and hoses for leaks or wear.			✓	✓	✓	✓
9	Inspect rail sweeps for close proximity to rail head.			✓	✓	✓	✓
10	Torque truck rim lock nuts.			✓	✓	✓	✓
11	Grease hydraulic cylinder pivot points.				✓	✓	✓
12	Grease inner tube lower pivot points.				✓	✓	✓
13	Grease inner tubes.				✓	✓	✓
14	Grease locking mechanism.				✓	✓	✓
15	Check fluid level in hydraulic reservoir. Top off with appropriate filtered fluid.				✓	✓	✓
16	Grease rail wheel bearings (3 months or 3,000 rail kms (1,900 rail miles), whichever is less).		✓			✓	✓
17	Inspect and repack rail wheel bearings.						✓
18	Perform rail wheel load check and railgear alignment procedures.						✓

FIGURE 3–8 : FRONT RAILGEAR LUBRICATION POINTS

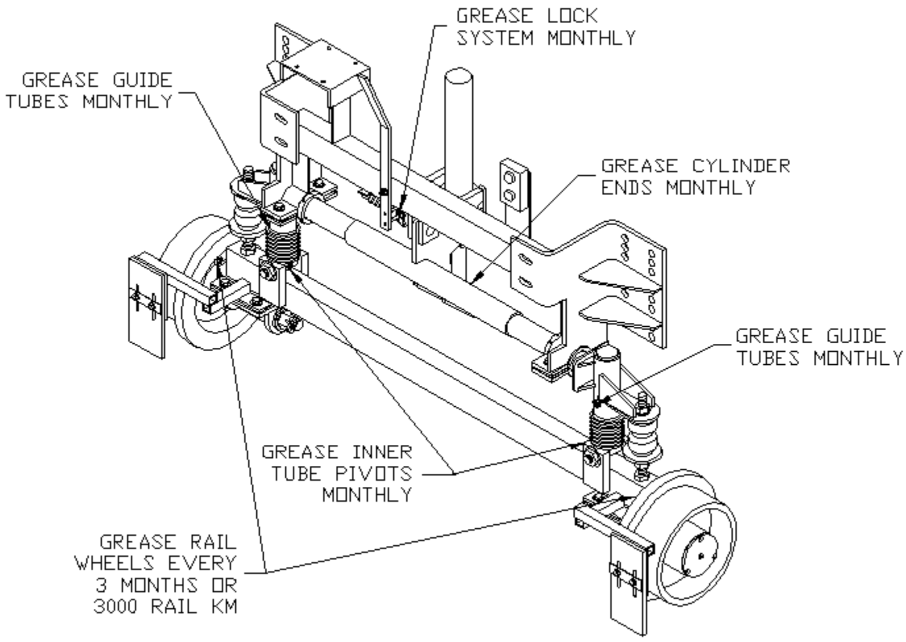


FIGURE 3–9: REAR RAILGEAR LUBRICATION POINTS

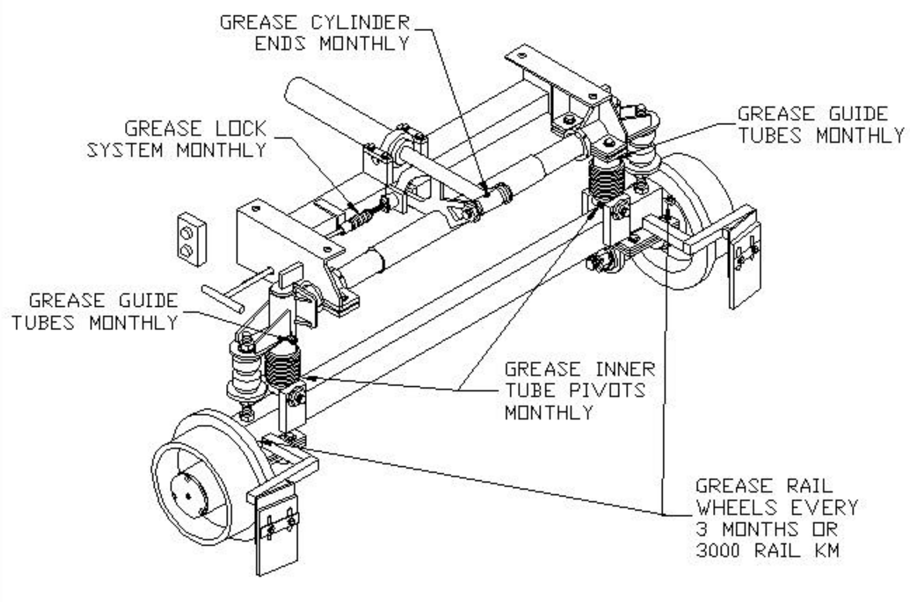


FIGURE 3-10: TRUCK RIM NUT TORQUE SEQUENCE

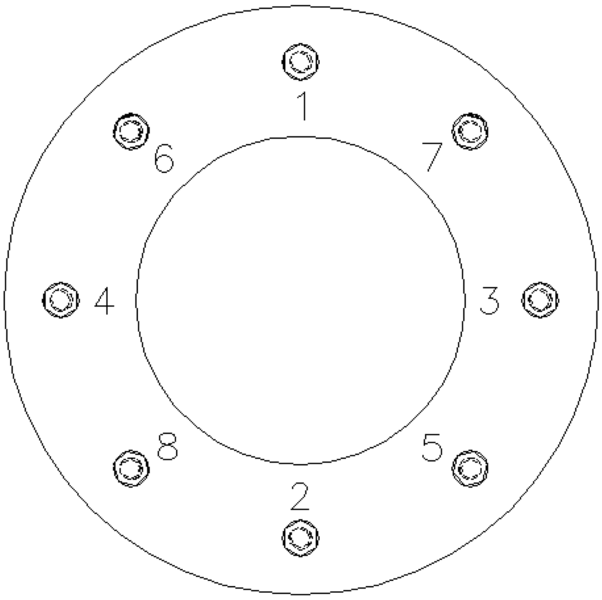
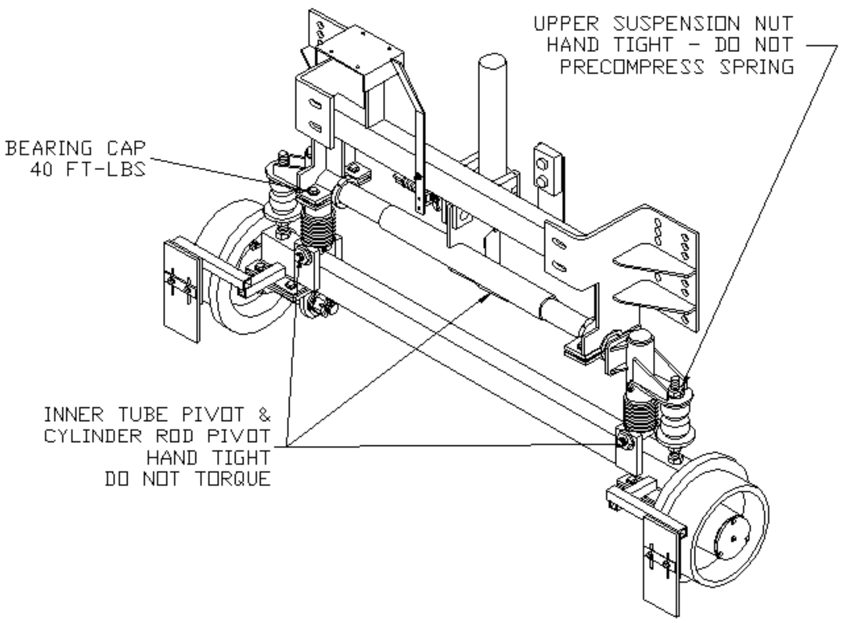


FIGURE 3-11: FRONT RAILGEAR NON-STANDARD BOLT TORQUES



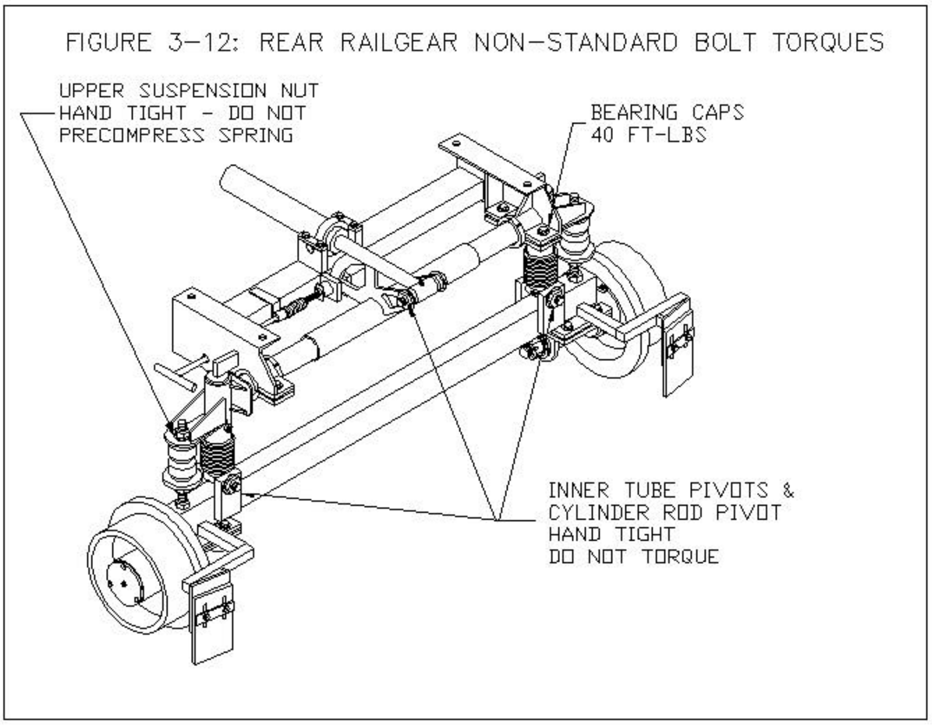


Table 3-3: Standard Bolt Torque Values

Bolt Detail	Bolt Torque Value (ft-lbs)
¾" UNC Gr. 8 Fasteners	175
5/8" UNC Gr. 8 Fasteners	150
½" UNC Gr. 8 Fasteners	100
3/8" UNC Gr. 8 Fasteners	40
¼" UNC Gr. 8 Fasteners	12

5.0 HYDRAULIC SYSTEM RELIEF VALVE SETTING

This system is equipped with one relief valve located on the railgear hydraulic pump. The relief valve will require adjustment at installation and if ever there appears to be inadequate hydraulic pressure to operate the railgear. Refer to figure 3-13 throughout the following adjustment procedure.

1. Locate the hydraulic hose (1) that supplies the rod end of the front railgear hydraulic cylinder (2) from the hydraulic pump pressure port (3) and disconnect it at the pump.

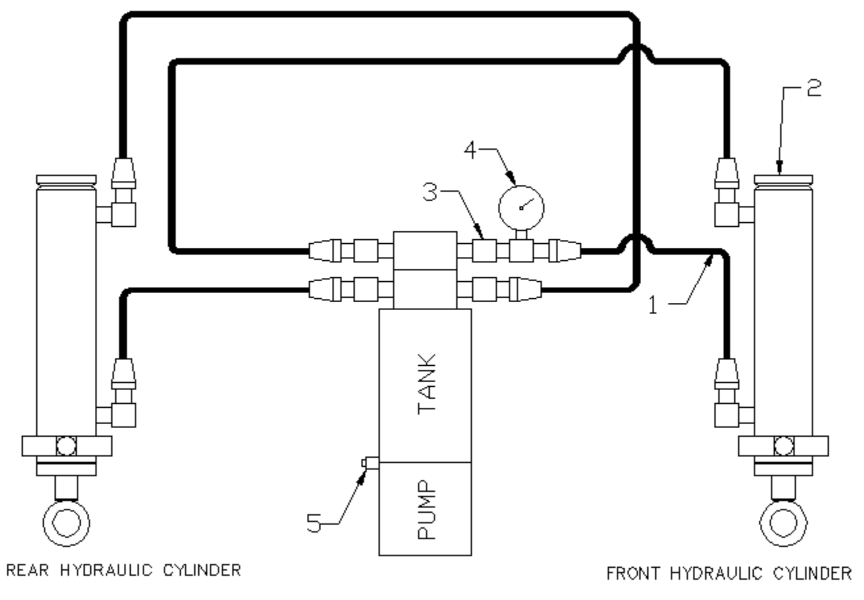
2. Install a test gauge (4) (up to 3000 PSI) between the disconnected hydraulic hose and the pump pressure port. The pressure gauge will indicate the relief valve (5) setting when the pump is loaded.

3. Raise the front railgear completely. Select the "Raise" position on the front control so that the hydraulic cylinder creates a load on the pump by trying to dead-head. The hydraulic pump should start and the pressure reading on the test gauge should climb to 1800 PSI.

4. If the pressure is not correct, release the front control and adjust the external relief valve on the pump accordingly.

5. Once the correct pressure on the pump relief valve is obtained, release the pressure in the system and remove the test gauge. Re-connect all hydraulic lines.

FIGURE 3-13 : HYDRAULIC RELIEF VALVE PRESSURE ADJUSTMENT



6.0 ELECTRICAL SYSTEM TROUBLESHOOTING

The following basic tests can be performed to check the integrity of the railgear electrical system. Refer to the electrical schematic in figure 3-14.

Should the hydraulic pump fail to operate, all wiring should be checked for shorts, the fuse should be checked and the following tests should be performed.

1. Pump motor coil shift test and voltage test (use a Volt-Meter in Volts-DC mode):
   a) Disconnect the wire from the coil "motor" terminal to the hydraulic pump motor.
   b) Ensure the coil "batt" terminal is connected to the positive terminal of the battery and the coil base is properly grounded. There should be 12V between the coil "batt" terminal and the coil base and 0V between the coil "motor" terminal and the coil base.
   c) Connect one end of a short "shunt" wire to the coil switching terminal and touch the other end to the coil "batt" terminal. The coil should shift in the housing producing a distinctive "click".
   d) With the "shunt" wire connected as in step c), the voltage between the coil "motor" terminal and the coil base should be 12V.
   e) If the coil does not "click" and/or the voltage in step d) is not 12V then the coil is inoperative and must be replaced.

2. Pump motor coil resistance test (use Ohm-Meter):
   a) Disconnect all wiring to the coil.
   b) Connect an Ohm-Meter to the coil switching terminal and to the coil base. The resistance should be about 20 Ohms.
   c) Connect an Ohm-Meter to the coil "motor" terminal and to the coil switching terminal. The resistance should be infinite (open). No resistance with this connection will indicate a shorted coil.
   d) Connect an Ohm-Meter to the coil "batt" terminal and to the coil switching terminal. The resistance should be infinite (open). No resistance with this connection will indicate a shorted coil.
   e) If the coil resistances are not within specifications, the coil must be replaced.

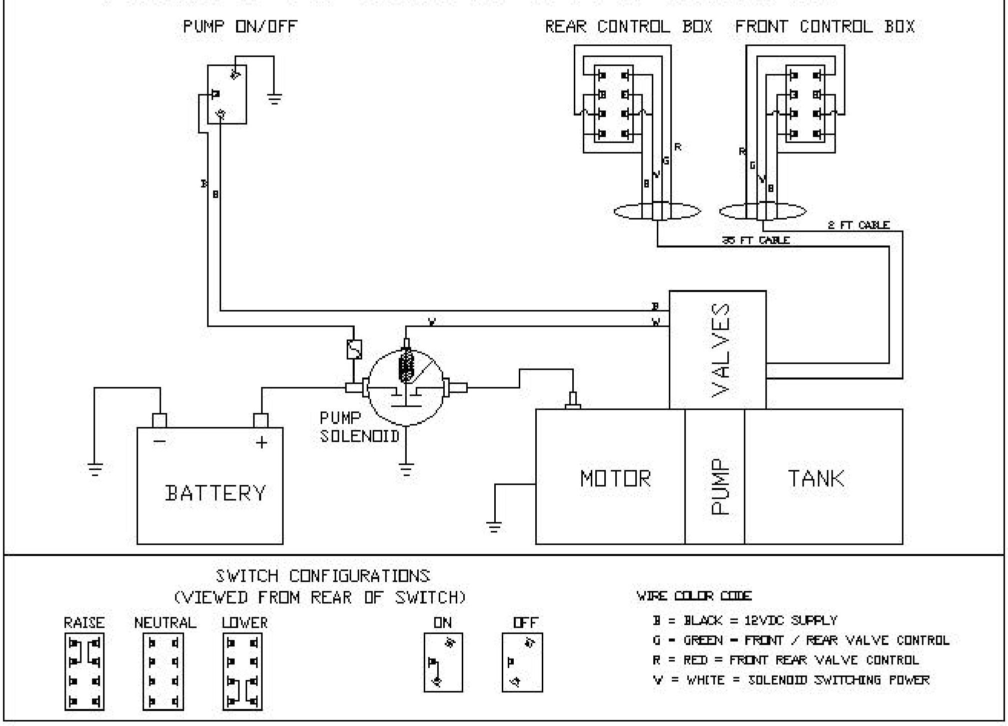
3. Pump motor test:
   a) Disconnect the pump motor wire from the coil.
   b) Ensure the pump base is properly grounded by running a ground strap from the motor base to the negative battery terminal.
   c) Connect one end of a large "shunt" wire to the pump motor positive terminal and touch the other end to the battery positive terminal.
   d) The pump motor should run upon touching the "shunt" wire.
   e) If the pump does not run, the pump motor is defective.

Should the pump motor start running immediately following turning on the respective dash switch, all wiring should be checked for shorts and the following should be performed.

1. Check the front and rear control switches for sticking or shorting out.

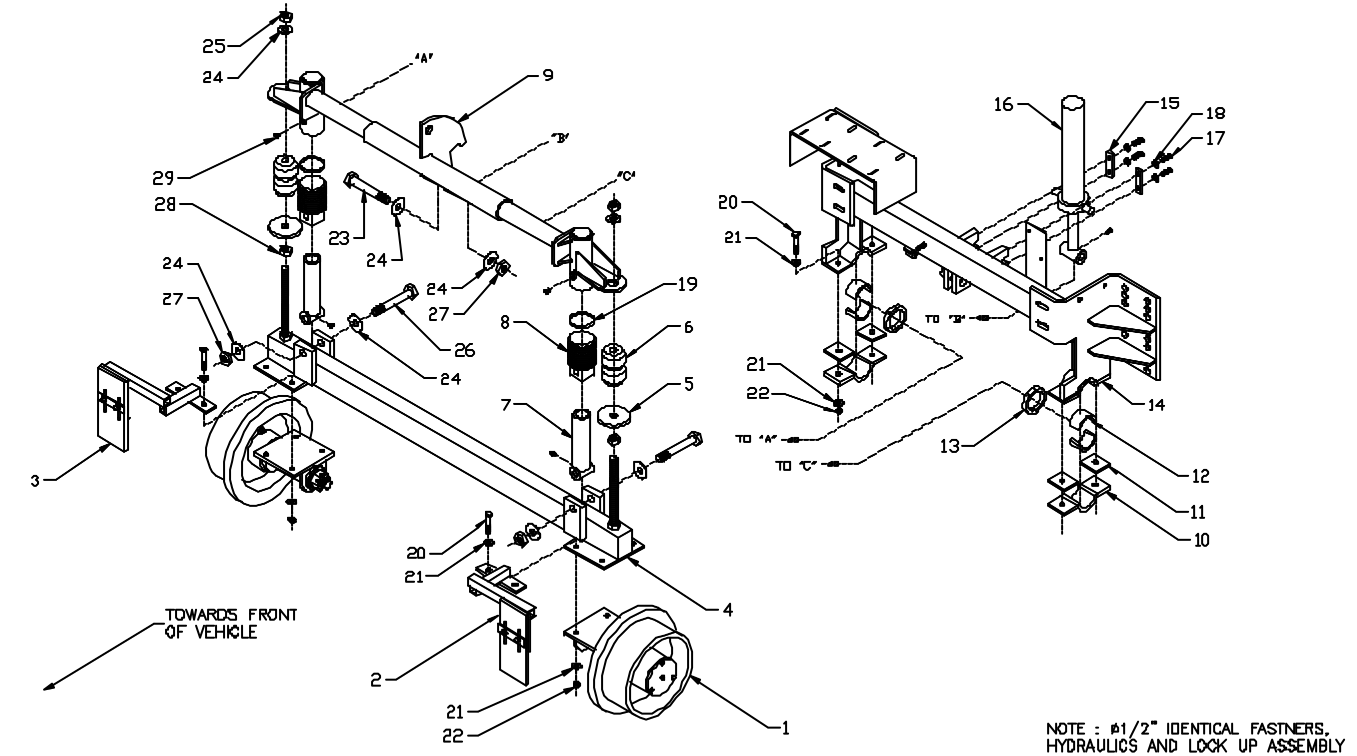
2. Disconnect the wire from the coil switching terminal. If the pump continues to run, then the coil is defective.

FIGURE 3–14: ELECTRIC SYSTEM SCHEMATIC



SECTION 4: PARTS

SECTION 5: APPENDIX

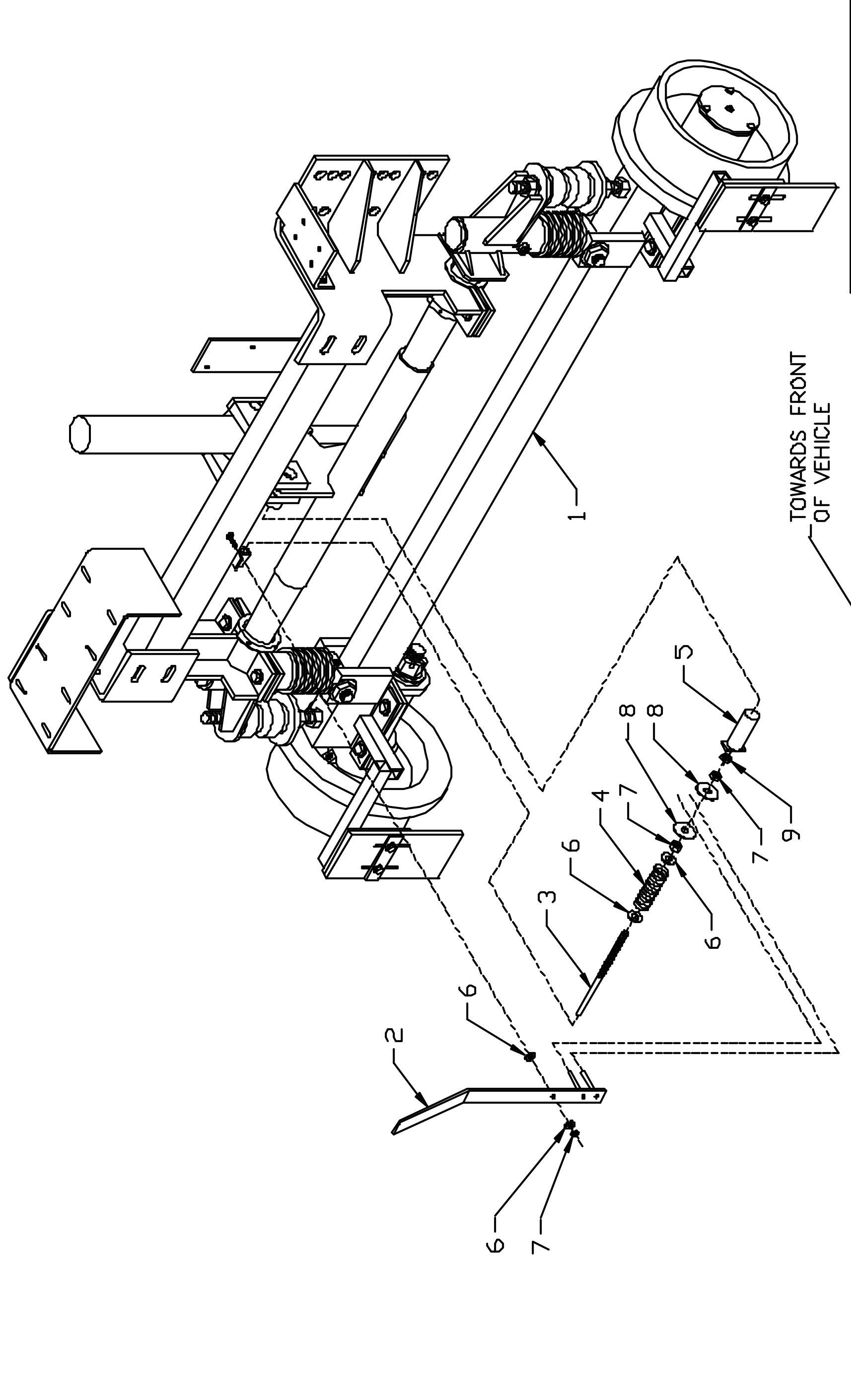


NOTE : ø1/2" IDENTICAL FASTNERS, HYDRAULICS AND LOCK UP ASSEMBLY ARE NOT SHOWN FOR CLARITY.

PARTS LIST

ITEM	PART NO.	PART DESCRIPTION	QTY/ASSEMBLY	ITEM	PART NO.	PART DESCRIPTION	QTY/ASSEMBLY
1	R-1600	10" WHEEL ASSEMBLY	2	18	-	3/8" SPLIT LOCK WASHER	4
2	R-2409L	LEFT SIDE RAIL SWEEP	1	19	R-601	BELLOWS CLAMP	2
3	R-2409R	RIGHT SIDE RAIL SWEEP	1	20	-	1/2" UNC GR 8 BOLT X 2" LONG	12
4	R-1597	AXLE ASSEMBLY	1	21	-	1/2" GR. 8 WASHER	24
5	R-3562	SPRING PLATE	2	22	-	1/2" UNC GR. 8 NYLON INSERT LOCK NUT	12
6	R-130	TIMBREN 320 / 75 RUBBER SPRING	2	23	-	3/4" UNC GR. 8 BOLT X 5" LONG	1
7	R-2609	INNER TUBE	2	24	-	3/4" GR. 8 WASHER	8
8	R-1505	BELLOWS	2	25	-	3/4" UNC GR 3 NYLON INSERT LOCK NUT	2
9	R-2691	FRONT CROSS FRAME	1	26	-	3/4" UNC GR 8 BOLT X 6.5" LONG	2
10	R-3602B	BEARING END CAP	2	27	-	3/4" UNC GR 3 NYLON INSERT LOCK NUT	3
11	R-3602A	SHIM	4	28	-	3/4" UNC JAN NUT	2
12	R-3618	SPLIT BEARING	2	29	-	1/8" NPT GREASE FITTING	5
13	R-2589	SPLIT COLLAR	2				
14	R-2690	FRONT CYLINDER FRAME	1				
15	R-2593B	TRUNNION CAP	2				
16	R-3613	HYDRAULIC CYLINDER (ø2" X 6" STROKE)	1				
17	-	3/8" UNC GR 8 BOLT X 1" LONG	4				

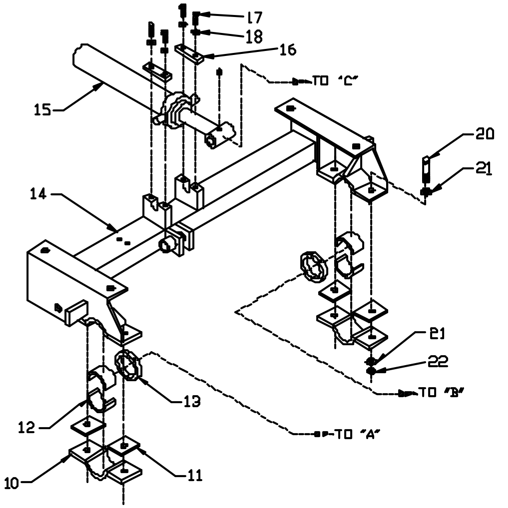
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MAT'L:	
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DRAWN: R.H	APPROVED:
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PAGE 1 OF 1	DWG: MO25RRG-1

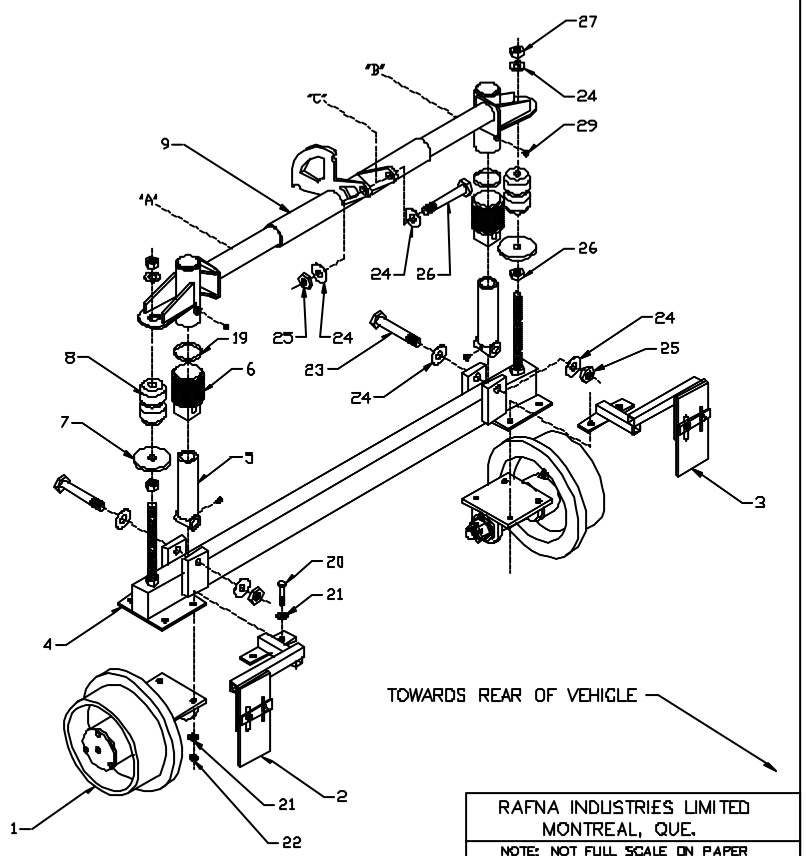


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MAT'L:	
PART NO.:	DATE: JULY 16/01
DRAWN: R.H.	APPROVED:
DIM: INCHES	DRAWING SCALE 1:1
PAGE 1 OF 1	DWG: MO25RRG-2

PARTS LIST

ITEM	PART NO.	PART DESCRIPTION	QTY/ASSEMBLY
1	-	ROTATING FRONT ASSEMBLY	1
2	R-2408	HANDLE	1
3	R-2892	PIN EXTENSION	1
4	R-3561	SPRING	1
5	R-3609	PIN	1
6	-	3/8" GR 8 WASHER	4
7	-	3/8" UNC GR. 3 NYLON INSERT LOCK NUT	3
8	-	9/16" SAE LARGE O D WASHER	2
9	-	3/8" UNC JAM NUT	1



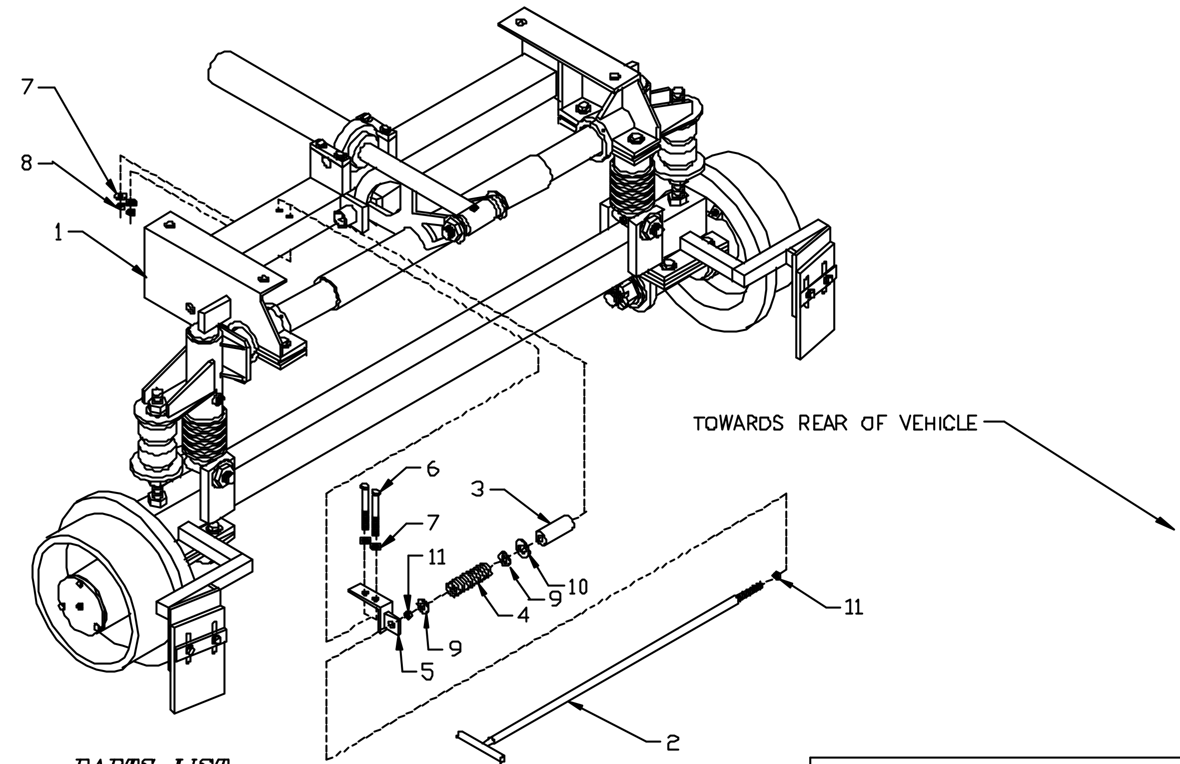


PARTS LIST

ITEM	PART NO.	PART DESCRIPTION	QTY/ASSEMBLY
1	R-1600	10" WHEEL ASSEMBLY	2
2	R-2409R	LEFT SIDE RAIL SWEEP	1
3	R-2409L	RIGHT SIDE RAIL SWEEP	1
4	R-1597	AXLE ASSEMBLY	1
5	R-2609	INNER TUBE	2
6	R-1505	BELLOWS	2
7	R-3562	SPRING PLATE	2
8	R-130	TIMBREN 520 / 75 RUBBER SPRING	2
9	R-2611	REAR CROSS FRAME	1
10	R-3602B	BEARING END CAP	2
11	R-3602A	SHIM	4
12	R-3618	SPLIT BEARING	2
13	R-2589	SPLIT COLLAR	2
14	R-2813	REAR CYLINDER FRAME	1
15	R-3613	HYDRAULIC CYLINDER	1
16	R-2593B	TRUNNION CAP	2
17	–	3/8" UNC GR. 8 BOLT X 1" LONG	4
18	–	3/8" SPLIT LOCK WASHER	4
19	R-601	BELLOWS CLAMP	2
20	–	1/2" UNC GR. 8 BOLT X 2" LONG	12
21	–	1/2" GR. 8 WASHER	24
22	–	1/2" UNC GR 8 NYLON INSERT LOCK NUT	12
23	–	3/4" UNC GR 8 BOLT X 6.5" LONG	2
24	–	3/4" GR. 8 WASHER	8
25	–	3/4" UNC GR 3 NYLON INSERT LOCK NUT	3
26	–	3/4" UNC GR. 8 BOLT X 5" LONG	1
27	–	3/4" UNC GR 3 NYLON INSERT LOCK NUT	2
28	–	3/4" UNC JAM NUT	2
29	–	1/8" NPT GREASE FITTING	5

NOTE : ø1/2" IDENTICAL FASTNERS, HYDRAULICS AND LOCK UP ASSEMBLY ARE NOT SHOWN FOR CLARITY.

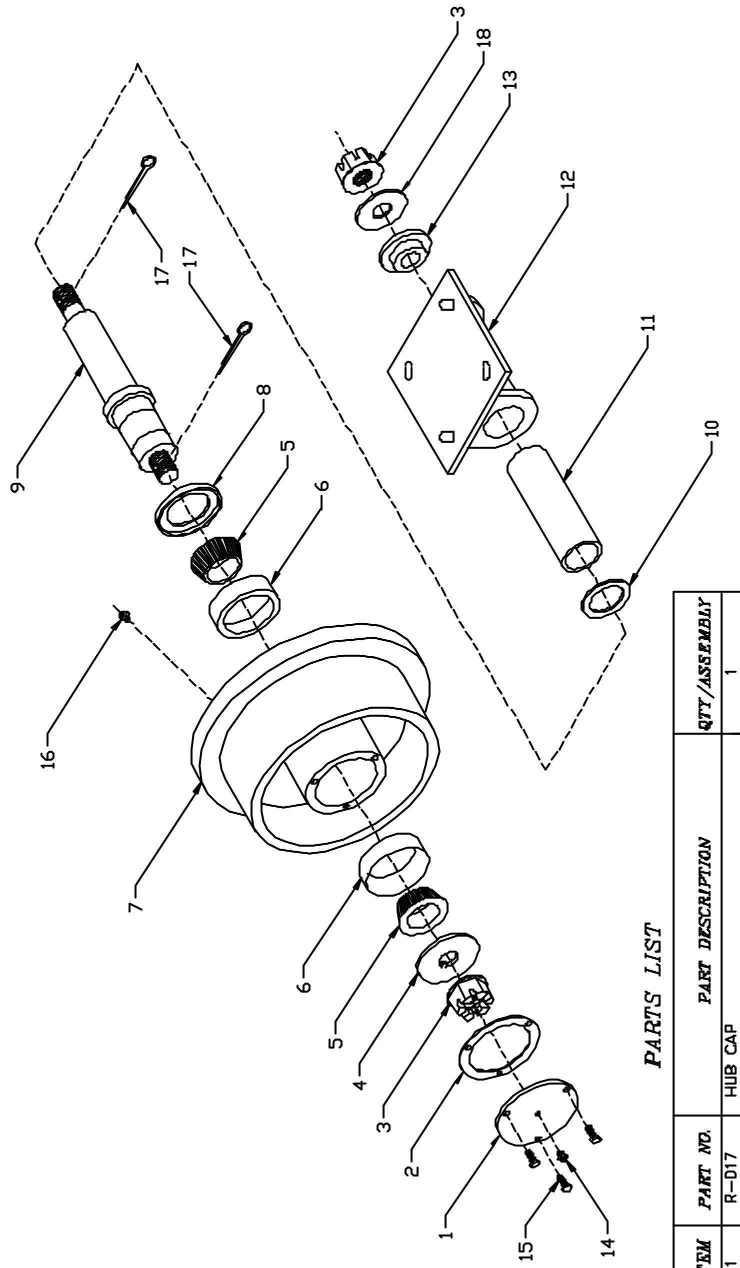
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DIM: INCHES	DRAWING SCALE 1:1
PAGE 1 OF 1	DWG: MO25RRG-3



PARTS LIST

ITEM	PART NO.	PART DESCRIPTION	QTY/ASSEMBLY
1	–	ROTATING REAR ASSEMBLY	1
2	R-483B	LOCKING CABLE	1
3	R-2812	LOCKING PIN	1
4	R-3561	SPRING	1
5	R-2809	REAR LOCK UP SUPPORT	1
6	–	3/8" UNC GR. 8 BOLT X 3" LONG	2
7	–	3/8" GR. 8 WASHER	4
8	–	3/8" UNC GR. 3 NYLON INSERT LOCK NUT	2
9	–	1/2" GR. 8 WASHER	2
10	–	5/8" GR. 8 WASHER	1
11	–	LOCKING CABLE NUT (PART OF ITEM #2)	2

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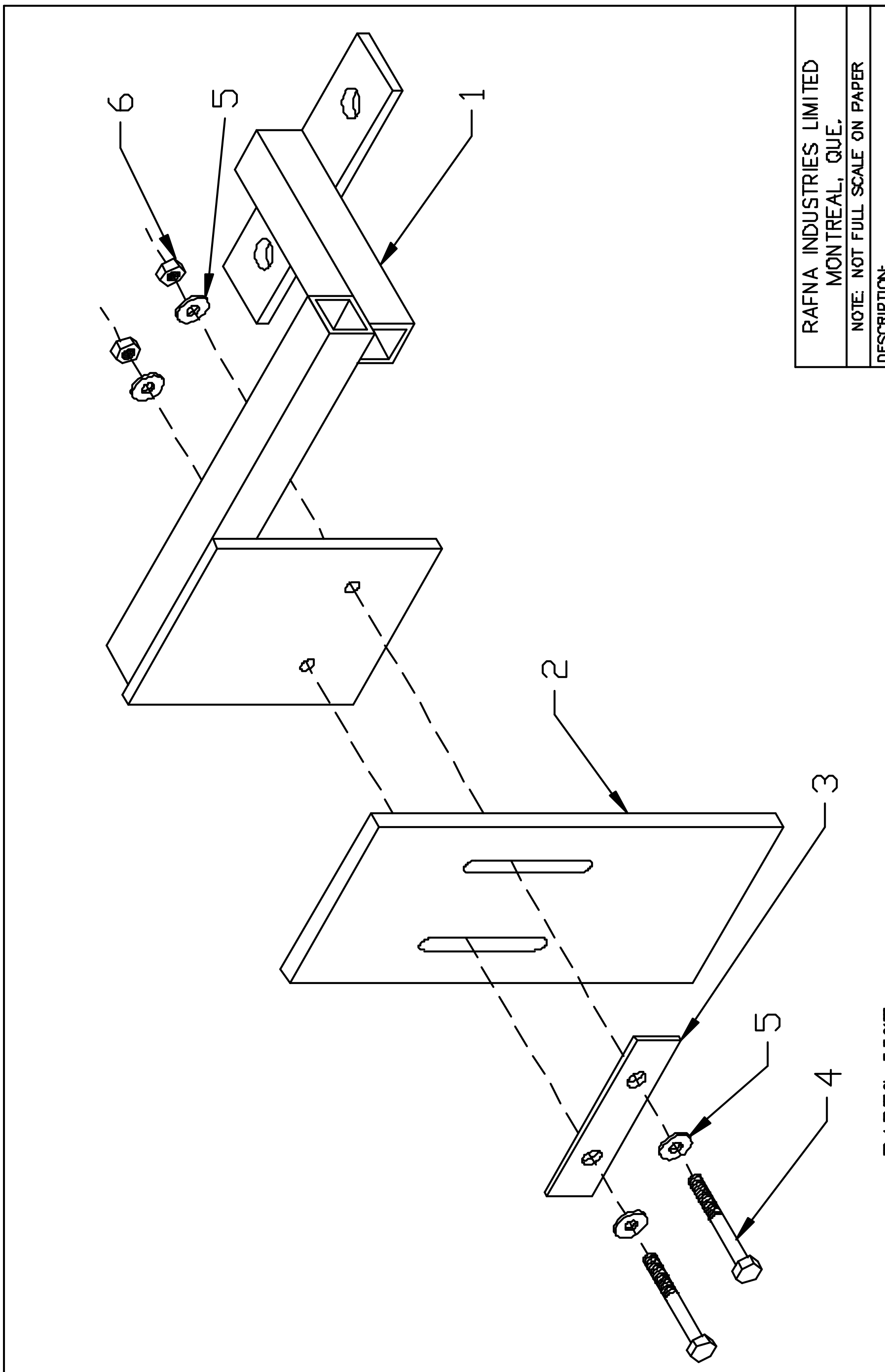


PARTS LIST

ITEM	PART NO.	PART DESCRIPTION	QTY/ASSEMBLY
1	R-017	HUB CAP	1
2	R-017A	GASKET	1
3	R-016	3/4" UNF SLOTTED NUT	2
4	R-014	SLOTTED WASHER	1
5	R-010	TAPERED ROLLER BEARING CONE	2
6	R-011	TAPERED ROLLER BEARING CUP	2
7	R-020	10" STEEL WHEEL	1
8	R-008	OIL SEAL	1
9	R-1602	SPINDLE	1
10	R-007	INSULATING WASHER	1
11	R-1603	SPINDLE INSULATOR	1
12	R-1593	SPINDLE HOUSING	1
13	R-005	INSULATING BUSHING	1
14	R-021	GREASE RELIEF	1
15	–	1/4" UNF BOLT X 0.75" LONG	3
16	–	1/8" NPT GREASE FITTING	1
17	–	3/16" COTTER PIN X 2" LONG	2
18	–	3/4" LARGE SAE WASHER	1

RAFNA INDUSTRIES LIMITED
MONTREAL, QUE.

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MAT'L:	
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RAFNA INDUSTRIES LIMITED
MONTREAL, QUE.

NOTE: NOT FULL SCALE ON PAPER

DESCRIPTION: RAIL SWEEP ASSEMBLY

REFERENCE: R-250 HD

MAT'L:

PART #: R-240BR/L | DATE: JULY 16/01

DRAWN: R.H. | APPROVED:

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PAGE 1 OF 1 | DWG: MO25RRG-6

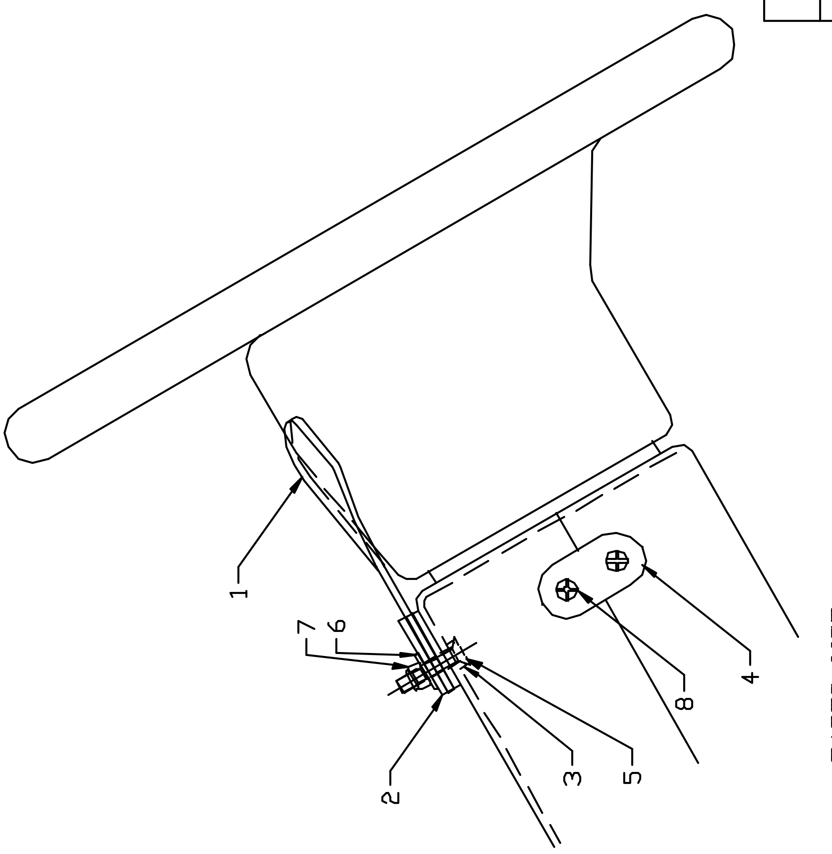
PARTS LIST

ITEM	PART NO.	PART DESCRIPTION	QTY/ASSEMBLY
1	R-2410R/L	RAIL SWEEP BRACKET (RIGHT / LEFT)	1
2	R-2411	RAIL SWEEP RUBBER	1
3	R-5561	SWEEPER PLATE	1
4	-	1/4" UNC GR.8 BOLT X 1.25" LONG	2
5	-	1/4" SAE WASHER	4
6	-	1/4" UNC GR 3 NYLON INSERT LOCK NUT	2

RAFNA INDUSTRIES LIMITED
MONTREAL, QUE.

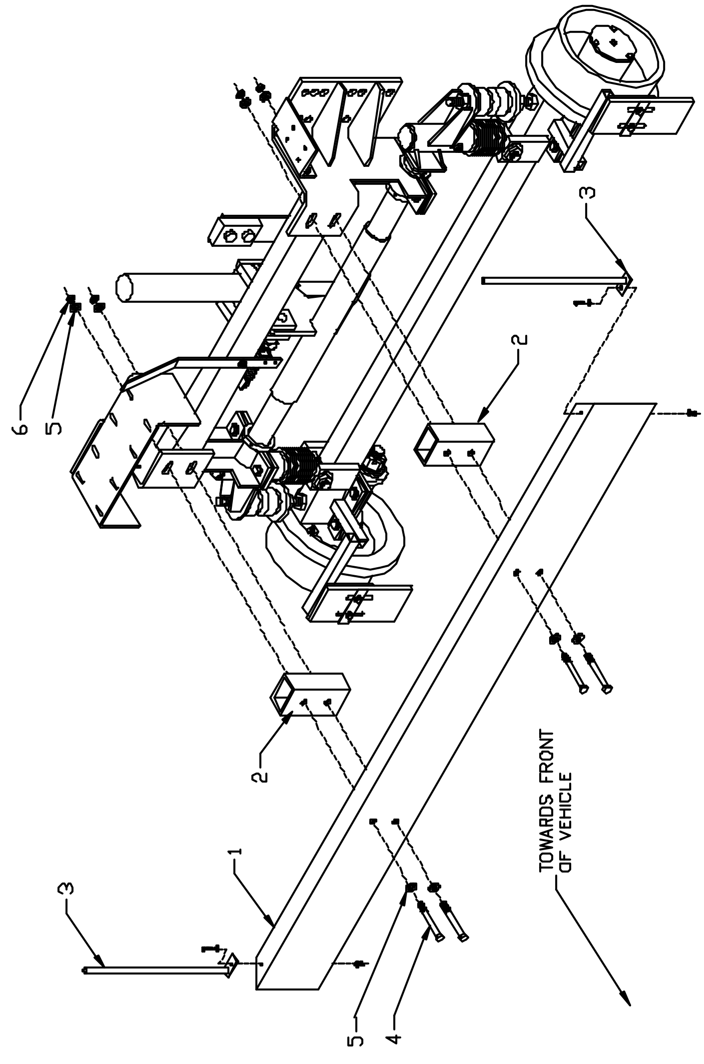
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DRAWN: R.H.	APPROVED:
DIM: INCHES	DRAWING SCALE 1:1
PAGE 1 OF 1	DWG: MO25RRG-7



PARTS LIST

ITEM	PART NO.	PART DESCRIPTION	QTY/ASSEMBLY
1	R-2481	STEERING WHEEL LOCK	1
2	R-2423	LOCK RETAINER	1
3	R-2425	BACKING PLATE	1
4	R-2486	STEERING COLUMN SIDE PLATE	2
5	-	1/4" UNC SUNK HEAD BOLT X 1.5" LONG	2
6	-	1/4" SAE WASHER	2
7	-	1/4" UNC GR 3 NYLON INSERT LOCK NUT	2
8	-	NO. 10 SELF-TAPPING SCREW X 0.5" LONG	4



RAFNA INDUSTRIES LIMITED
MONTREAL, QUE

NOTE: NOT FULL SCALE ON PAPER

DESCRIPTION: FRONT RAILGEAR BUMPER ASSEMBLY

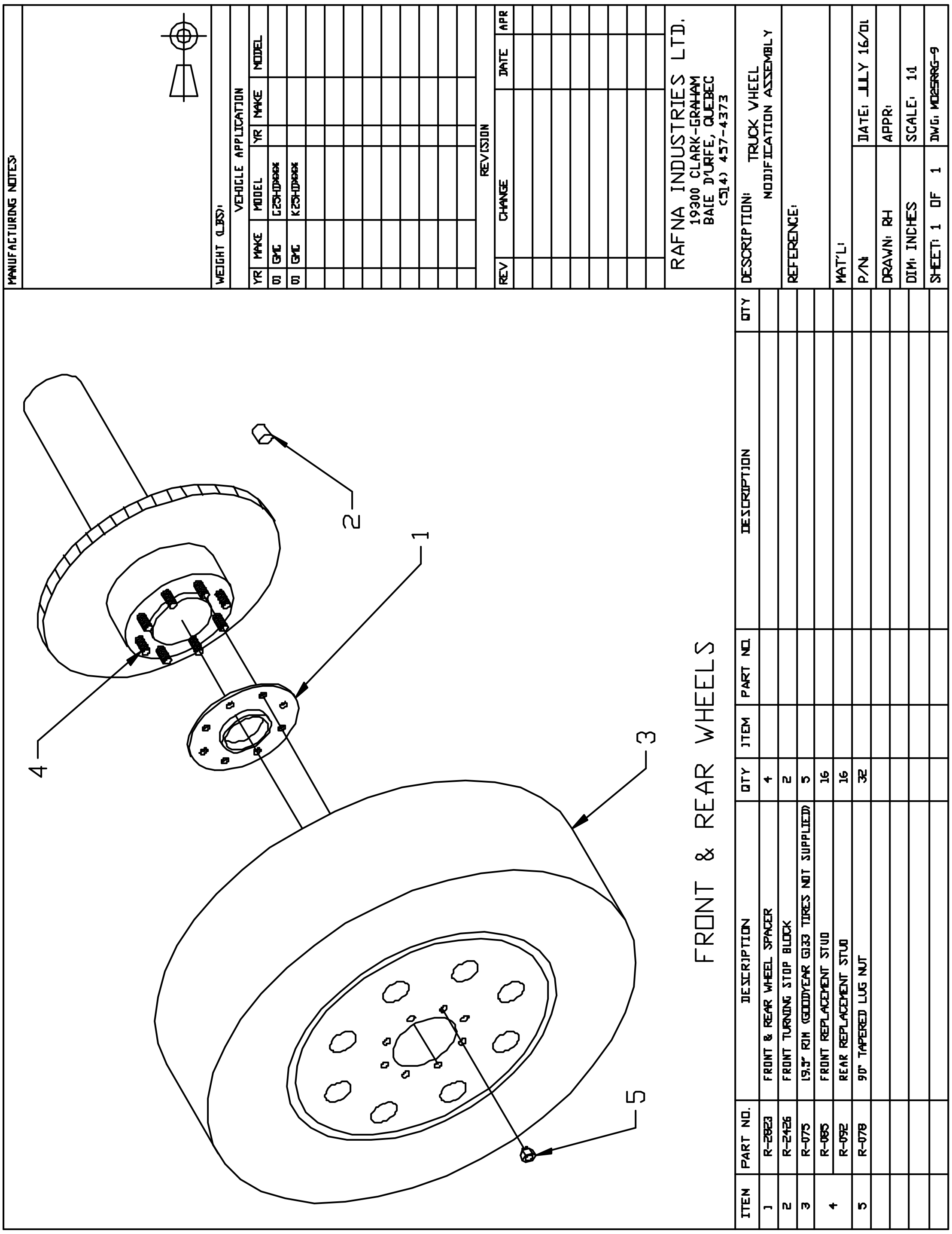
REFERENCE: R-250 HD

MAT'L:

PART NO.: | DATE: JULY 16/01
DRAWN: R.H. | APPROVED:
DIM: INCHES | DRAWING SCALE 1:1
PAGE 1 OF 1 | DWG: MO25RRG-8

PARTS LIST

ITEM	PART NO.	PART DESCRIPTION	QTY/ASSEMBLY
1	R-2687AL	RAILGEAR FRONT BUMPER	1
2	R-2688	FRONT BUMPER SPACER	2
3	R-051	SIDE WAND SET WITH FASTENERS	1
4	-	1/2" UNC GR. 8 BOLT X 4" LONG	4
5	-	1/2" GR. 8 WASHER	8
6	-	1/2" UNC GR. 8 NYLON INSERT LOCK NUT	4


FRONT & REAR WHEELS
1
2
3
4
5
MANUFACTURING NOTES:
WEIGHT (LBS):
VEHICLE APPLICATION
YR MAKE MODEL YR MAKE MODEL
01 GMC C25HD
01 GMC K25HD
REVISION
REV CHANGE DATE APR
RAFNA INDUSTRIES LTD.
19300 CLARK-GRAHAM
BAIE D'URFE, QUEBEC
(514) 457-4373
ITEM PART NO. DESCRIPTION QTY ITEM PART NO. DESCRIPTION QTY
1 R-2023 FRONT & REAR WHEEL SPACER 4
2 R-2426 FRONT TURNING STOP BLOCK 2
3 R-075 19.5" RIM (GOODYEAR G133 TIRES NOT SUPPLIED) 5
4 R-085 FRONT REPLACEMENT STUD 16
R-092 REAR REPLACEMENT STUD 16
5 R-078 90° TAPERED LUG NUT 32
DESCRIPTION: TRUCK WHEEL MODIFICATION ASSEMBLY
REFERENCE:
MAT'L:
P/N:
DATE: JULY 16/01
DRAWN: RH
APPR:
DIM: INCHES
SCALE: 1:1
SHEET: 1 OF 1
DWG: MO25RRG-9

MANUFACTURING NOTES:

WEIGHT (LBS):

VEHICLE APPLICATION					
YR	MAKE	MODEL	YR	MAKE	MODEL
03	GMC	C***906			
03	GMC	K***906			

REVISION

REV	CHANGE	DATE	APR

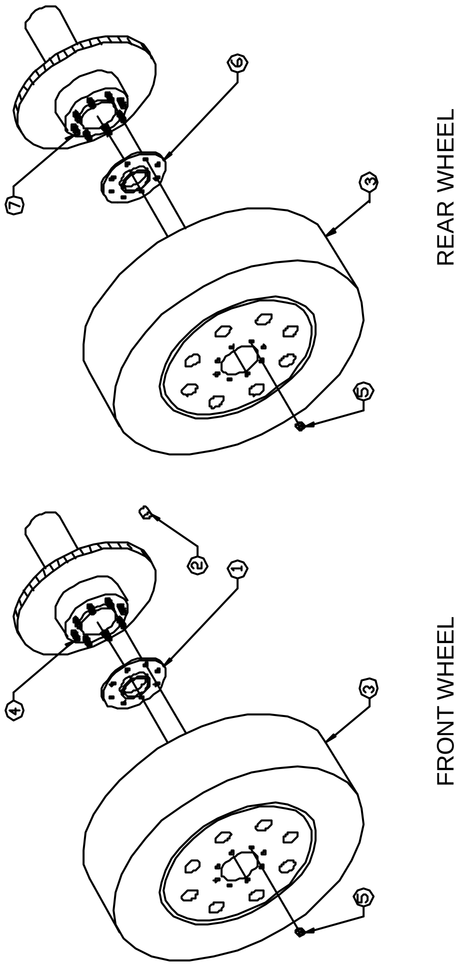
RAFNA INDUSTRIES LTD.
19300 CLARK-GRAHAM
BAIE D'URFE, QUEBEC
(514) 457-4373

DESCRIPTION: TRUCK WHEEL MODIFICATION ASSEMBLY

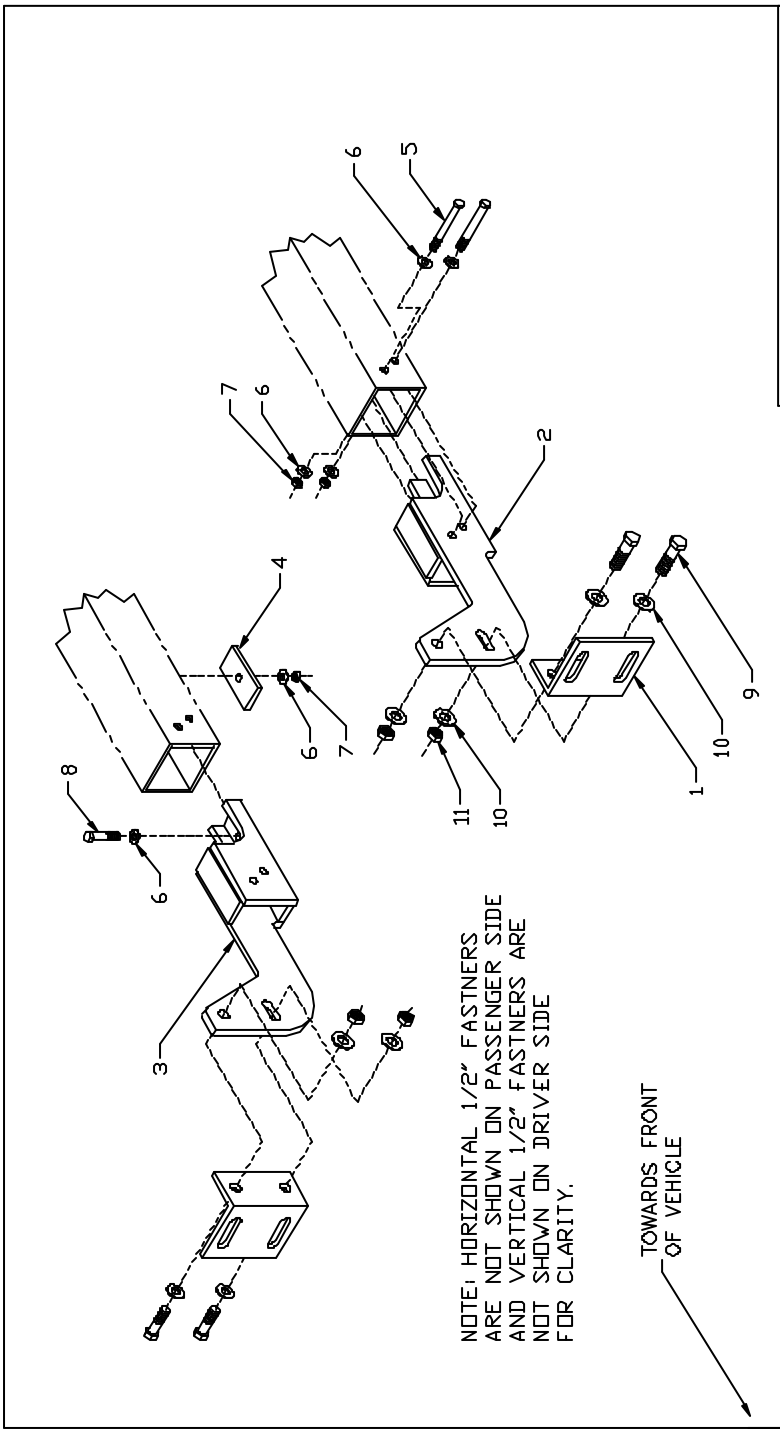
REFERENCE: 2003 GMC SUBURBAN

MAT'L:

P/N: | DATE: MAY 1B, 2003
DRAWN: RH | APPR:
DIM: INCHES | SCALE:
SHEET: 1 OF 1 | DWG: MO25RRG-9A



ITEM	PART NO.	DESCRIPTION	QTY
1	R-2823	FRONT WHEEL SPACER (1/2" OFFSET)	2
2	R-2428	FRONT TURNING STOP BLOCK	2
3	R-075	19.5" RIM (GOODYEAR G133 TIRES NOT SUPPLIED)	5
4	R-085	FRONT REPLACEMENT STUD	16
5	R-078	90' TAPERED LUG NUT	32
6	R-2823A	REAR WHEEL SPACER (3/4" OFFSET)	2
7	R-092	REAR REPLACEMENT STUD	16

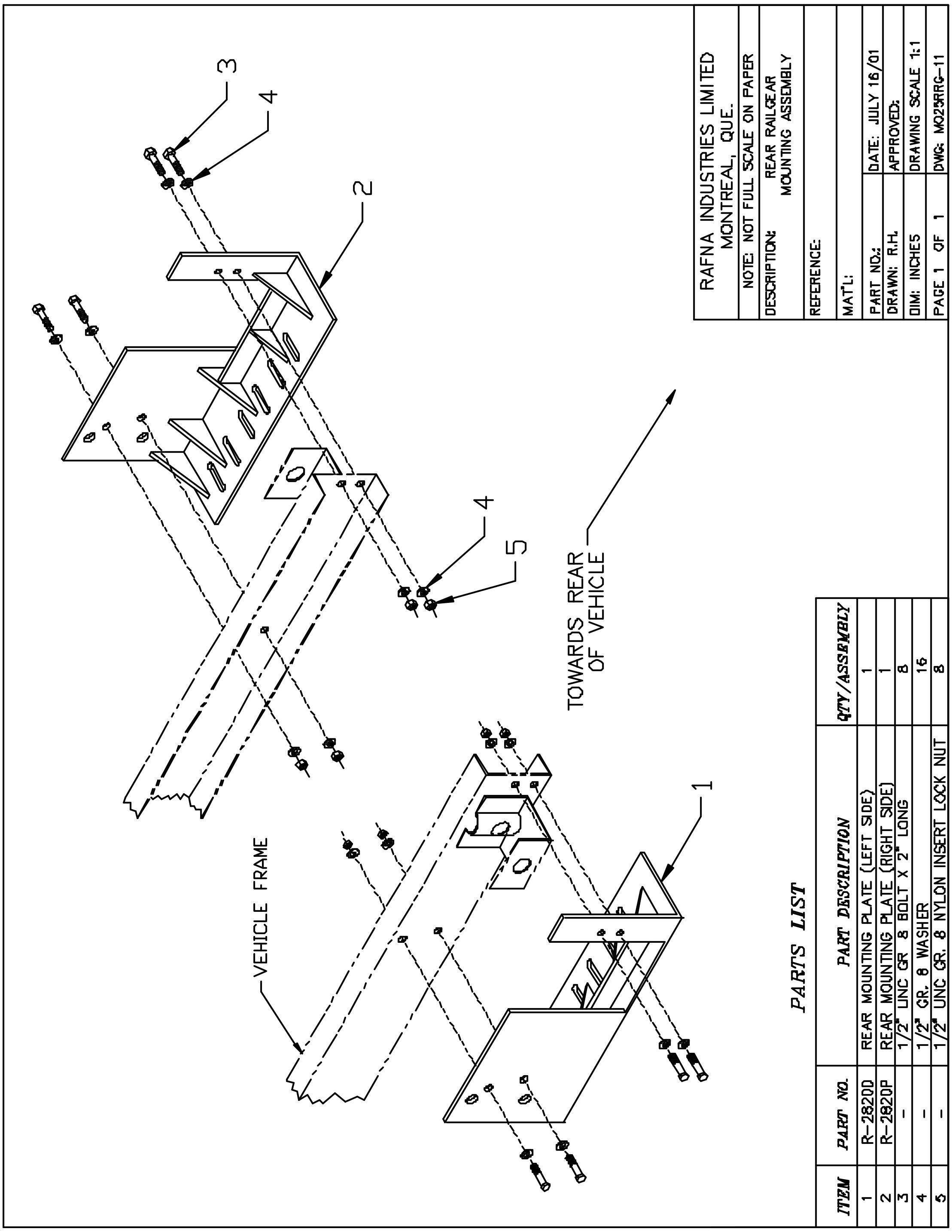


RAFNA INDUSTRIES LIMITED
MONTREAL, QUE.

NOTE: NOT FULL SCALE ON PAPER	
DESCRIPTION: FRONT RAILGEAR MOUNTING ASSEMBLY	
REFERENCE:	
MAT'L:	
PART NO.:	DATE: JULY 18/01
DRAWN: R.H.	APPROVED:
DIM.: INCHES	DRAWING SCALE 1:1
PAGE 1 OF 1	DWG: MO25RRG-10

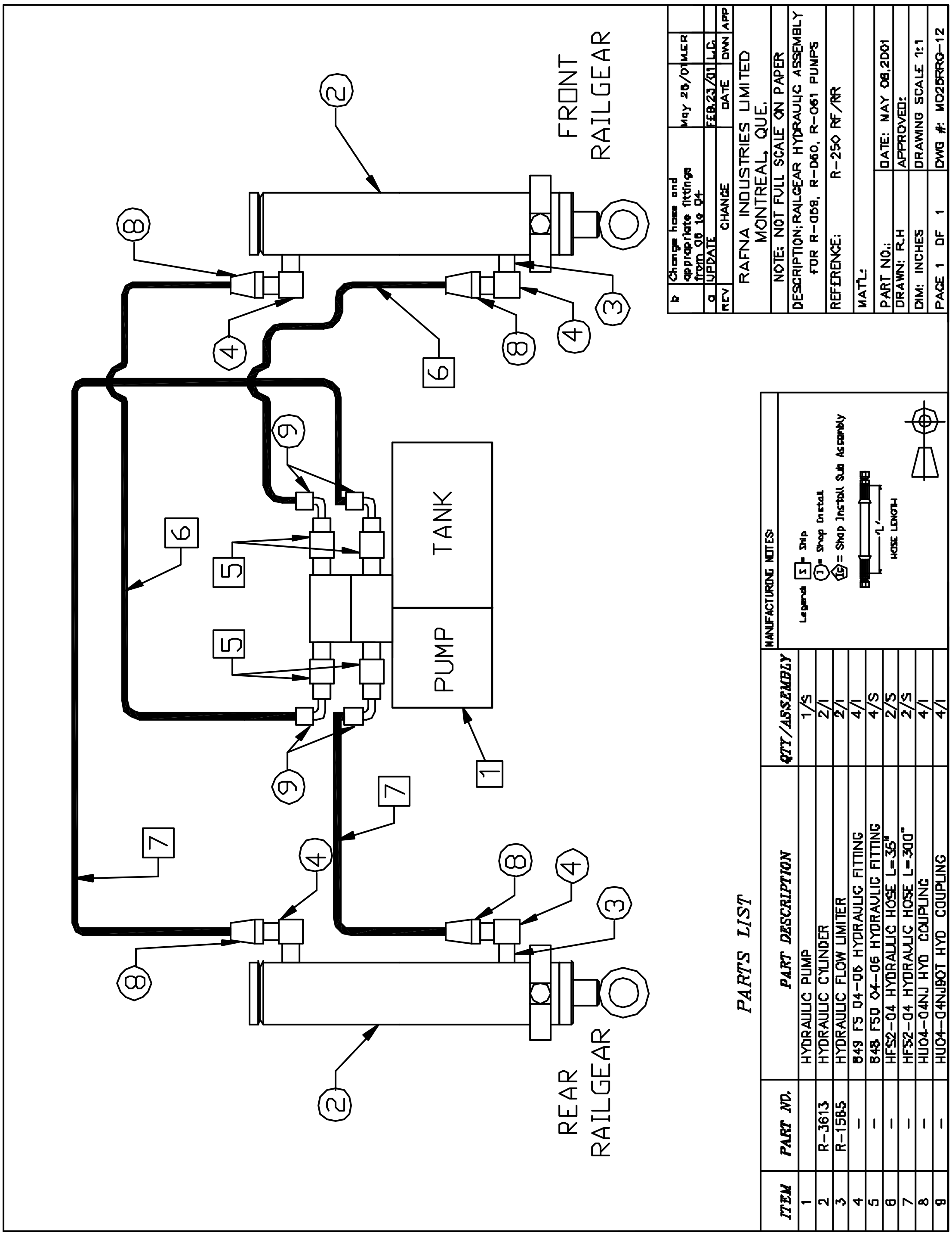
PARTS LIST

ITEM	*PART NO.*	*PART DESCRIPTION*	*QTY/ASSEMBLY*
1	R-2850	MOUNTING ANGLE	2
2	R-2477D	MOUNTING PLATE (LEFT SIDE)	1
3	R-2477P	MOUNTING PLATE (RIGHT SIDE)	1
4	R-2438	WASHER PLATE	2
5	-	1/2" UNC GR. 8 BOLT X 4.5" LONG	4
6	-	1/2" GR 8 WASHER	12
7	-	1/2" UNC GR. 8 NYLON INSERT LOCK NUT	6
8	-	1/2" UNC GR 8 BOLT X 2" LONG	2
9	-	3/4" UNC GR. 8 BOLT X 2" LONG	4
10	-	3/4" GR 8 WASHER	8
11	-	3/4" UNC GR. 8 NYLON INSERT LOCK NUT	4



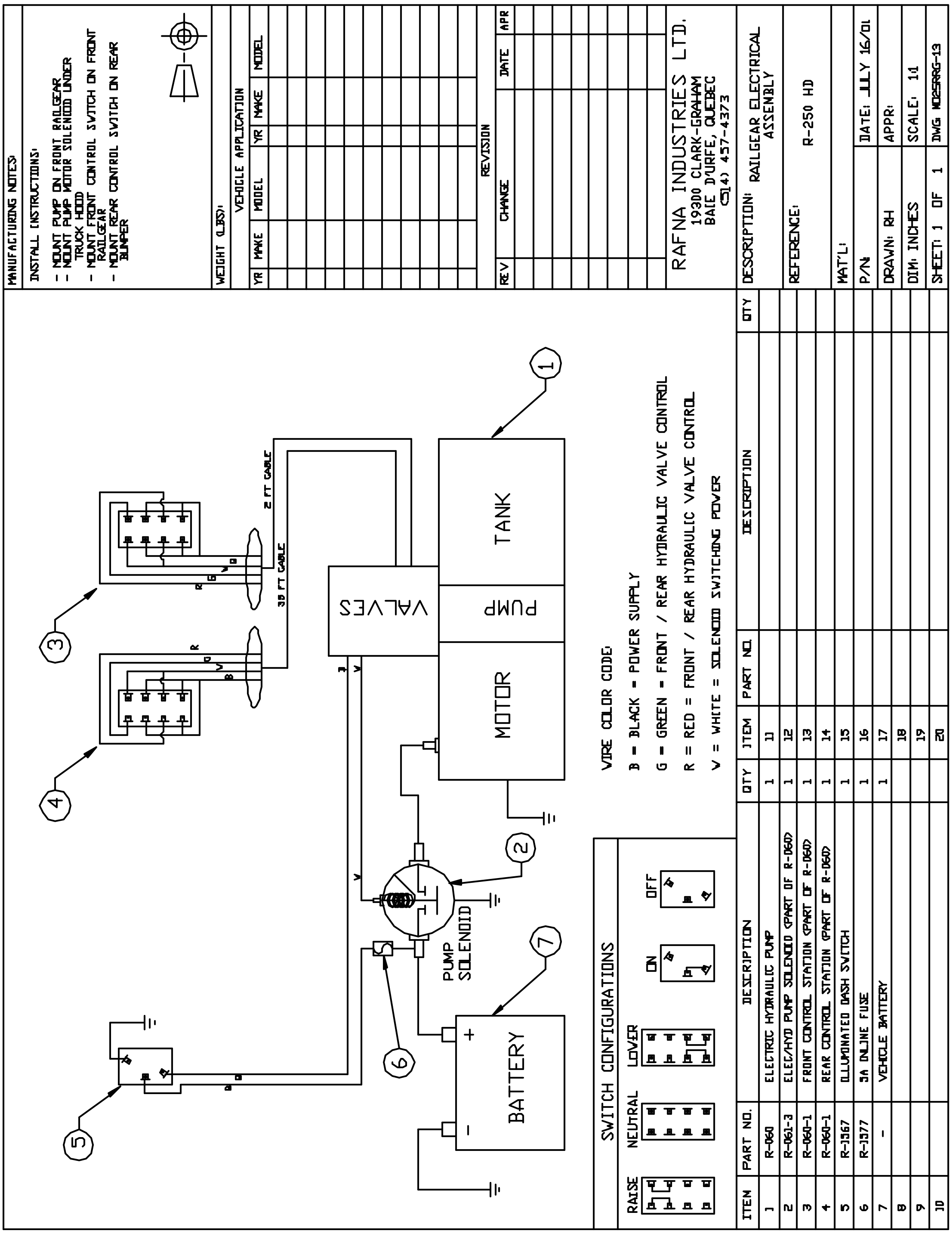
PARTS LIST

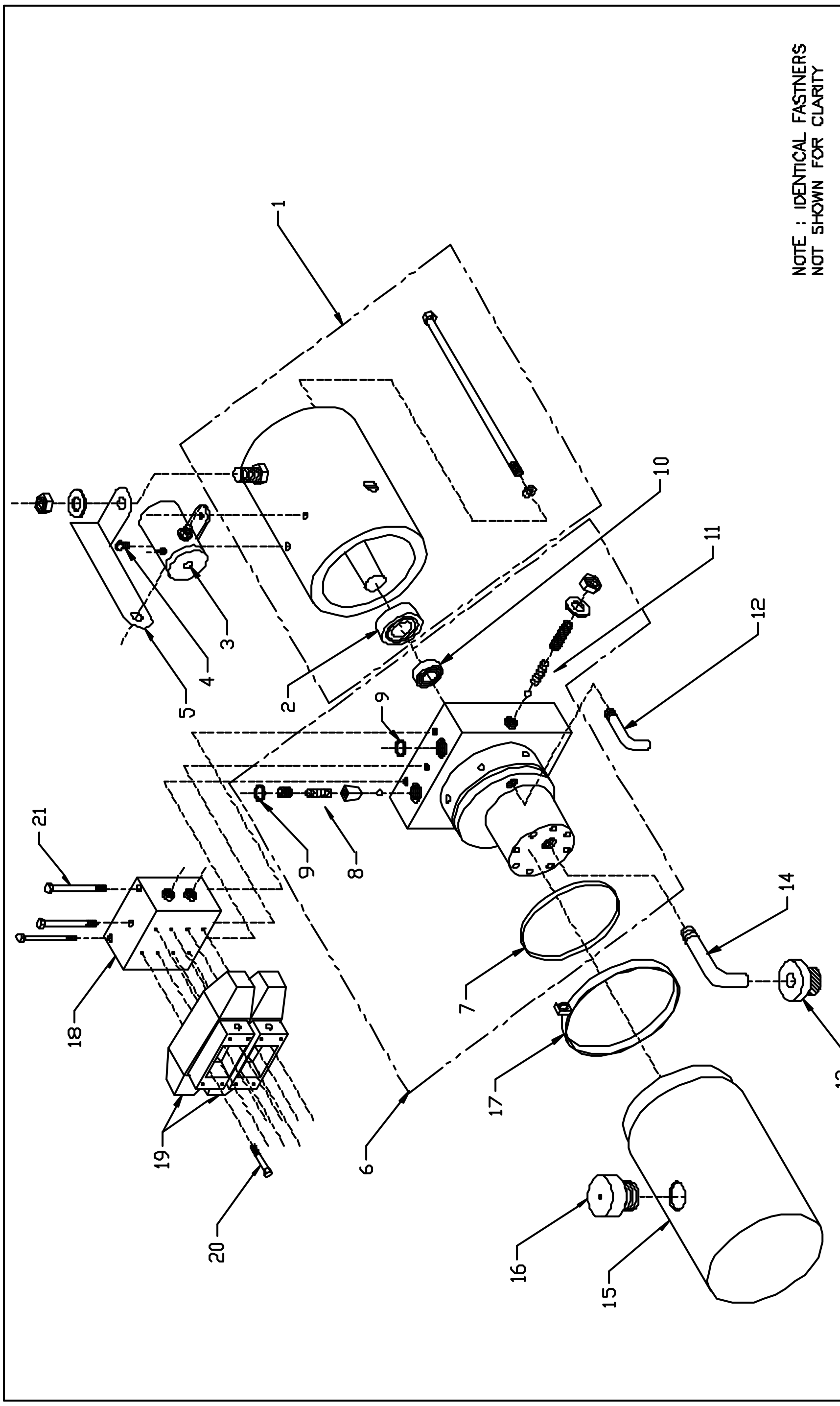
ITEM	PART NO.	PART DESCRIPTION	QTY/ASSEMBLY
1	R-2820D	REAR MOUNTING PLATE (LEFT SIDE)	1
2	R-2820P	REAR MOUNTING PLATE (RIGHT SIDE)	1
3	-	1/2" UNC GR 8 BOLT X 2" LONG	8
4	-	1/2" GR. 8 WASHER	16
5	-	1/2" UNC GR. 8 NYLON INSERT LOCK NUT	8



PARTS LIST

ITEM	PART NO.	PART DESCRIPTION	QTY/ASSEMBLY
1		HYDRAULIC PUMP	1/S
2	R-3613	HYDRAULIC CYLINDER	2/I
3	R-1585	HYDRAULIC FLOW LIMITER	2/I
4	—	849 FS 04-06 HYDRAULIC FITTING	4/I
5	—	848 FS0 04-06 HYDRAULIC FITTING	4/S
6	—	HFS2-04 HYDRAULIC HOSE L=35"	2/S
7	—	HFS2-04 HYDRAULIC HOSE L=300"	2/S
8	—	HU04-04NJ HYD COUPLING	4/I
9	—	HU04-04NJBOT HYD COUPLING	4/I


MANUFACTURING NOTES:
INSTALL INSTRUCTIONS:
- MOUNT PUMP ON FRONT RAILGEAR
- MOUNT PUMP MOTOR SOLENOID UNDER TRUCK HOOD
- MOUNT FRONT CONTROL SWITCH ON FRONT RAILGEAR
- MOUNT REAR CONTROL SWITCH ON REAR BUMPER
WEIGHT (LBS):
VEHICLE APPLICATION
YR MAKE MODEL YR MAKE MODEL
REVISION
REV CHANGE DATE APR
RAFNA INDUSTRIES LTD.
19300 CLARK-GRAHAM
BAIE D'URFE, QUEBEC
(514) 457-4373
DESCRIPTION: RAILGEAR ELECTRICAL ASSEMBLY
REFERENCE: R-250 HD
MAT'L:
P/N: DATE: JULY 16/01
DRAWN: RH APPR:
DIM: INCHES SCALE: 1:1
SHEET: 1 OF 1 DWG MO25RRG-13
TANK
PUMP
MOTOR
VALVES
BATTERY
PUMP SOLENOID
2 FT CABLE
30 FT CABLE
WIRE COLOR CODE:
B = BLACK = POWER SUPPLY
G = GREEN = FRONT / REAR HYDRAULIC VALVE CONTROL
R = RED = FRONT / REAR HYDRAULIC VALVE CONTROL
W = WHITE = SOLENOID SWITCHING POWER
SWITCH CONFIGURATIONS
RAISE NEUTRAL LOWER ON OFF
ITEM PART NO. DESCRIPTION QTY
1 R-060 ELECTRIC HYDRAULIC PUMP 1
2 R-061-3 ELEC/HYD PUMP SOLENOID (PART OF R-060) 1
3 R-060-1 FRONT CONTROL STATION (PART OF R-060) 1
4 R-060-1 REAR CONTROL STATION (PART OF R-060) 1
5 R-1567 ILLUMINATED DASH SWITCH 1
6 R-1577 5A INLINE FUSE 1
7 - VEHICLE BATTERY 1



RAFNA INDUSTRIES LIMITED MONTREAL, QUE.	
NOTE: NOT FULL SCALE ON PAPER	
DESCRIPTION: RAILGEAR PUMP ASSEMBLY	
REFERENCE:	
MAT'L:	
PART NO: R-060	DATE: JULY 16/01
DRAWN: R.H.	APPROVED:
DIM: INCHES	DRAWING SCALE 1:1
PAGE 1 OF 1	DWG: MO25RRG-14

PARTS LIST

ITEM	PART NO.	PART DESCRIPTION	QTY/ASSEMBLY
1	R-061-1	ELECTRIC MOTOR ASSEMBLY	1
2	R-061-2	BEARING	1
3	R-061-3	SOLENOID SWITCH	1
4	R-061-4	SCREW	2
5	R-061-5	STRAP	1
6	R-061-6	PUMP ASSEMBLY	1
7	R-061-7	O-RING	1
8	R-061-8	POPPET CHECK VALVE KIT	1
9	R-061-9	O-RING	2
10	R-061-10	SEAL	1
11	R-061-11	RELIEF VALVE KIT	1
12	R-061-12	RETURN TUBE	1
13	R-061-13	FILTER SCREEN	1
14	R-061-14	SUCTION TUBE	1
15	R-061-15	RESERVOIR	1
16	R-061-16	VENT PLUG	1
17	R-061-17	CLAMP	1
18	R-061-18	VALVE ASSEMBLY	1
19	R-061-19	SOLENOID VALVE	2
20	R-061-20	SCREW	8
21	R-061-21	SCREW	3
–	R-060-1	DUAL PUSH BUTTON CONTROL (NOT SHOWN)	2
–	R-062-25	MOUNTING BRACKET (NOT SHOWN)	1

Rafna Industries Limited

A Global Railway Industries Company

Form MA-01

MANUAL ADDENDUM

MA #:	MO25RRG-0-MA02 Rev. 1
Date:	May 22, 2003

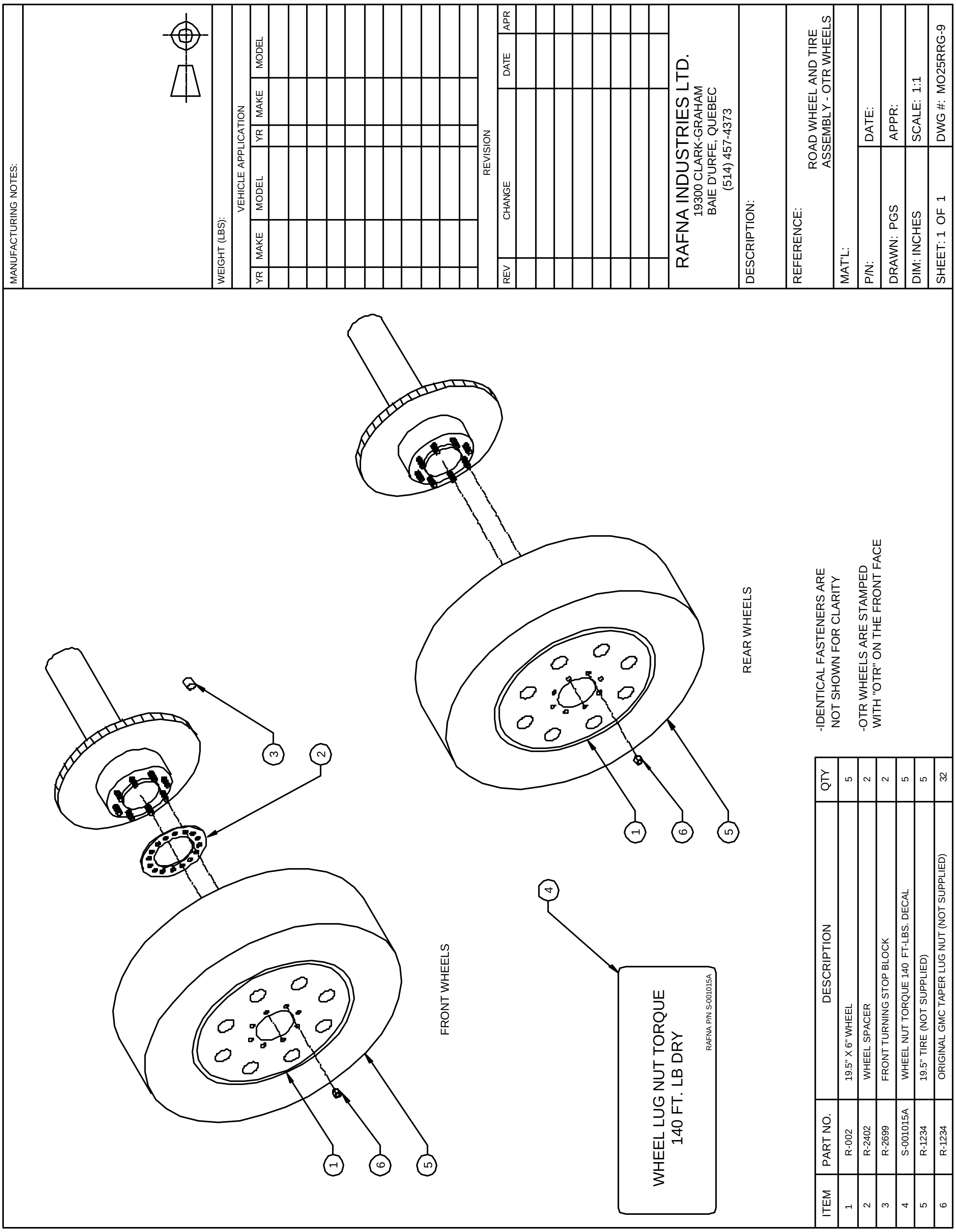
AFFECTED MANUAL / RAILGEAR

Railgear Model:	R-250 (GMC Vehicles)
Manual #:	MO25RRG
Affected Page(s):	Section 4 – Parts (page 4-9)

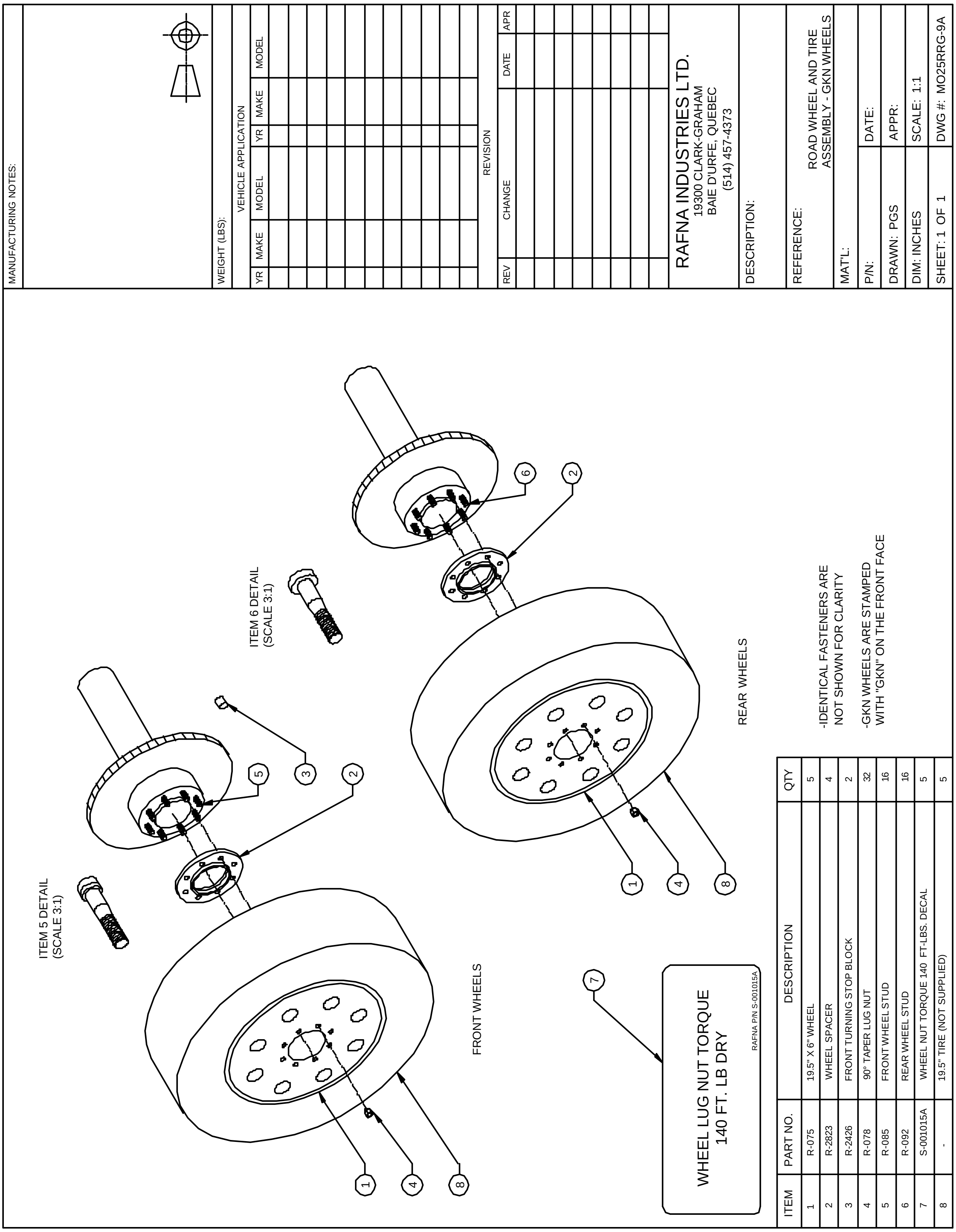
Addendum Information:

This addendum updates the Operation, Parts and Service Manual to include parts drawings for OTR and GKN road wheels fitted to the vehicle.

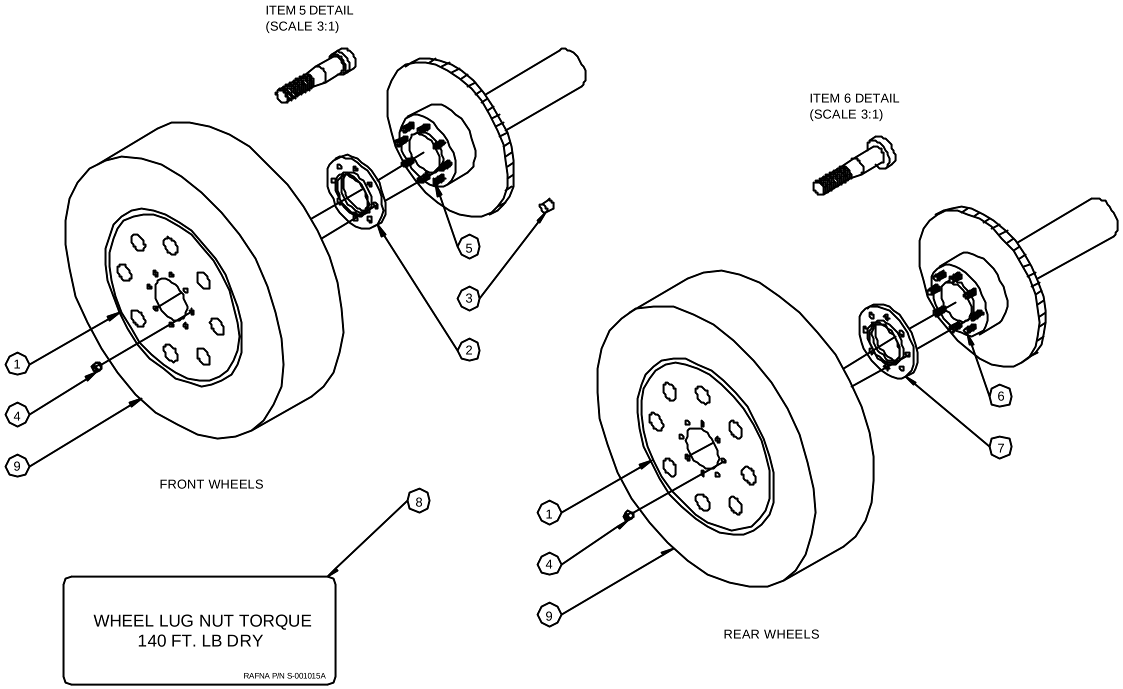
Replace the part drawing in the manual with attached parts drawings.



ITEM	PART NO.	DESCRIPTION	QTY
1	R-002	19.5" X 6" WHEEL	5
2	R-2402	WHEEL SPACER	2
3	R-2699	FRONT TURNING STOP BLOCK	2
4	S-001015A	WHEEL NUT TORQUE 140 FT-LBS. DECAL	5
5	R-1234	19.5" TIRE (NOT SUPPLIED)	5
6	R-1234	ORIGINAL GMC TAPER LUG NUT (NOT SUPPLIED)	32



ITEM	PART NO.	DESCRIPTION	QTY
1	R-075	19.5" X 6" WHEEL	5
2	R-2823	WHEEL SPACER	4
3	R-2426	FRONT TURNING STOP BLOCK	2
4	R-078	90° TAPER LUG NUT	32
5	R-085	FRONT WHEEL STUD	16
6	R-092	REAR WHEEL STUD	16
7	S-001015A	WHEEL NUT TORQUE 140 FT-LBS. DECAL	5
8	-	19.5" TIRE (NOT SUPPLIED)	5



PARTS LIST

ITEM	PART NO.	PART DESCRIPTION	QTY/ASSEMBLY
1	R-075	19.5" X 6" WHEEL	5
2	R-2823	FRONT WHEEL SPACER (1/2" OFFSET)	2
3	R-2426	FRONT TURNING STOP BLOCK	2
4	R-078	90° TAPER LUG NUT	32
5	R-085	FRONT WHEEL STUD	16
6	R-092	REAR WHEEL STUD	16
7	R-2823A	REAR WHEEL SPACER (3/4" OFFSET)	2
8	S-001015A	WHEEL NUT TORQUE 140 FT-LBS. DECAL	5
9	-	19.5" TIRE (NOT SUPPLIED)	5

-IDENTICAL FASTENERS ARE NOT SHOWN FOR CLARITY

-GKN WHEELS ARE STAMPED WITH "GKN" ON THE FRONT FACE

MANUFACTURING NOTES:

WEIGHT (LBS):

VEHICLE APPLICATION

YR	MAKE	MODEL	YR	MAKE	MODEL
03	GMC	C25906			
03	GMC	K25906			

REVISION

REV	CHANGE	DATE	APR

RAFNA INDUSTRIES LTD.
19300 CLARK-GRAHAM
BAIE D'URFE, QUEBEC
(514) 457-4373

DESCRIPTION: TRUCK WHEEL MODIFICATION ASSEMBLY	
REFERENCE: 2003 GMC SUBURBAN	
MAT'L:	
P/N:	DATE: MAY 18, 2003
DRAWN: EDo	APPR:
DIM: INCHES	SCALE:
SHEET: 1 OF 1	DWG: MO25RRG-9B

MANUAL ADDENDUM

MA #: MO25RRG-0-MA03 Rev. 1
Date: May 14, 2003

Affected Manual / Railgear

Railgear Model: R-250
Manual #: MO25RRG Rev. 0
Affected Page(s): Additional Operating Procedure and Parts Drawing

Addendum Information:

This addendum updates the Operation, Parts and Service Manual to include the operation of, and the parts drawing of the 'Hook and Loop' style steering wheel lock. The enabling and disabling procedures need to be added to the manual, along with a parts drawing. This steering wheel lock is an option, and does not replace the existing steering wheel lock.

Also attached to this addendum is a new parts drawing for the 'Hook and Loop' steering wheel lock. Refer to the attached parts drawing for parts and quantities required for installation.

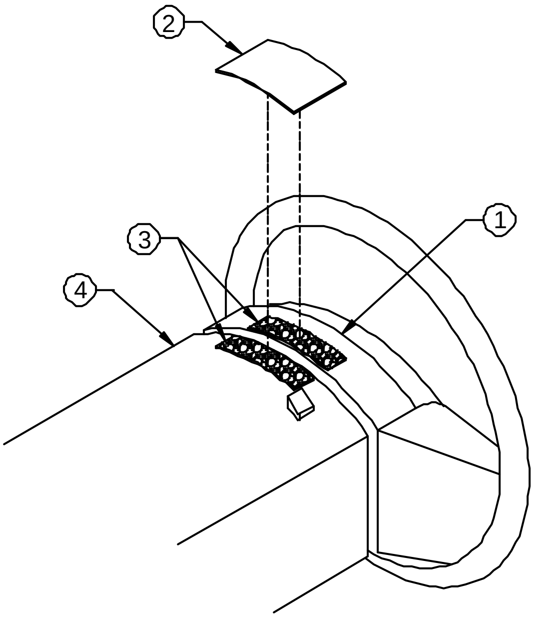
The following procedures should be added to the 'Operation Section' of the Operating, Parts and Service Manual:

2.0 PLACING THE VEHICLE ON THE TRACK:

8a. Engage the steering wheel lock system:
For vehicles fitted with the 'Hook and Loop' steering wheel lock system (refer to figure 2-4):

a) Turn the steering wheel (Item 1) until the front tires point straight ahead.
b) Position the 'hook' portion (Item 2) of the 'Hook and Loop' steering wheel lock onto the 'loop' strips (Item 3) affixed to the steering wheel and steering wheel column cover (Item 4). The hooks should mate with the loops. Press firmly into place.

Figure 2-4: Steering Wheel Lock Operation - 'Hook and Loop'

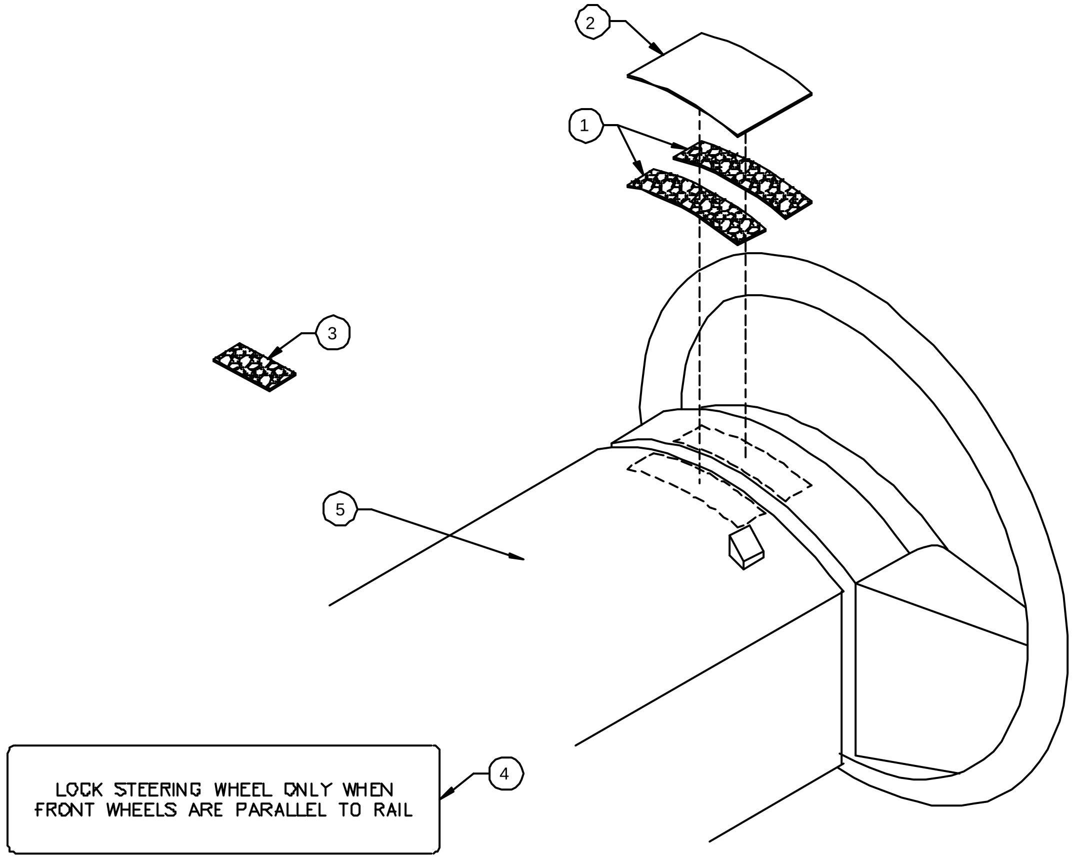


5.0 REMOVING THE VEHICLE FROM THE TRACK:

8a. Disengage the steering wheel lock system:
For vehicles fitted with the 'Hook and Loop' steering wheel lock system (refer to figure 2-4):

a) Firmly grasp one side of the 'hook' portion (Item 1) of the 'Hook and Loop' steering wheel lock, and peel the strip over itself to remove.
b) Store the 'hook' strip on the 'hook strip holder' located in the cab.

Note: Take care when removing the 'hook' strip. Due to certain plasticizers in the steering wheel and steering wheel column, along with the vehicle's operating environment, the adhesive on the 'loop' strips may give way and be removed. If the 'loop' strip is removed, replace it at the earliest convenience.



PARTS LIST

ITEM	PART NO.	PART DESCRIPTION	QTY/ASSEMBLY
1	S-001050	1-½" x 4" LONG 'LOOP' STRIPS WITH ADHESIVE BACK	2
	S-001050B	1-½" x 4" LONG 'LOOP' STRIPS WITH ADHESIVE BACK	
2	S-001050A	4" x 5" LONG 'HOOK' STRIP WITHOUT ADHESIVE BACK	1
3	S-001050C	HOOK STRIP HOLDER (1-½" X 2" LONG W / ADHESIVE BACK)	1
	S-001050G	HOOK STRIP HOLDER (1-½" X 2" LONG W / ADHESIVE BACK)	
4	S-001040	STEERING WHEEL LOCK DECAL	1
5	-	STEERING WHEEL AND COLUMN	-

RAFNA INDUSTRIES LIMITED
A Global Railway Industries Company
19300 Clark Graham, Baie d'Urfé, Québec Canada H9X 3R8

TITRE/TITLE: 'HOOK AND LOOP' STEERING WHEEL LOCK ASSEMBLY

NO. DE DESS. DE CLIENT/CUST. DWG NO.	DESSIGNE PAR/DRAWN BY	
	PGS	
NUMERO DE DESSIN/DRAWING NUMBER	REV.	PAGE
MO25RRG	0	7A

MANUAL ADDENDUM

MA #: MO25RRG-0-MA04
Date: May 18, 2003

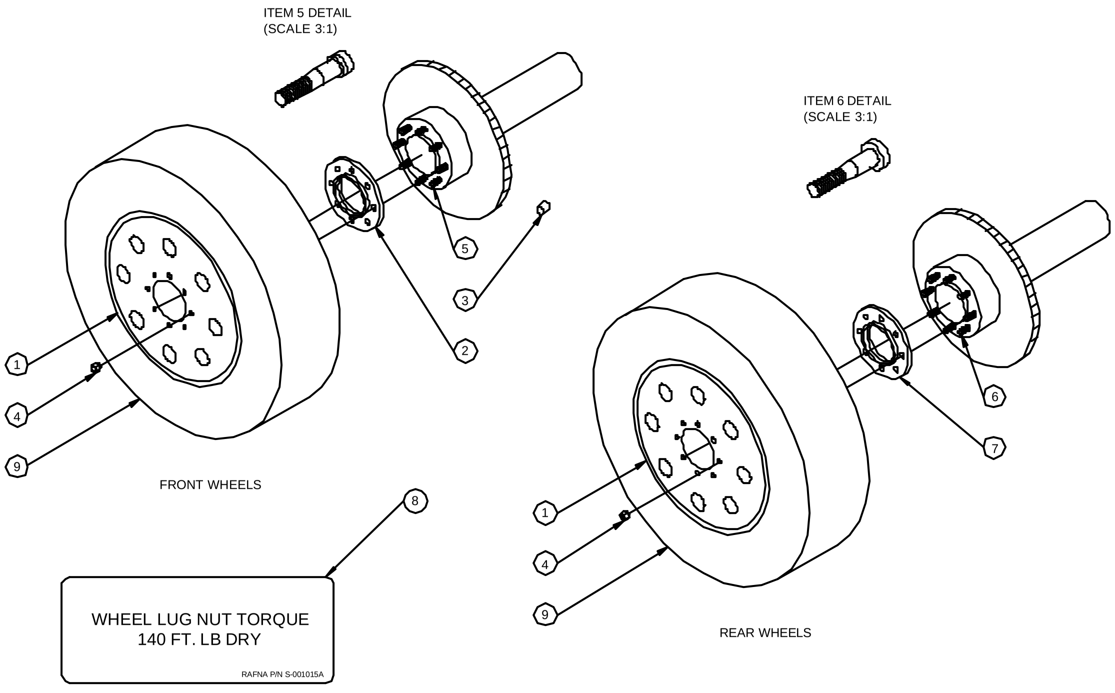
Affected Manual / Railgear

Railgear Model: R-250
Manual #: MO25RRG Rev. 0
Affected Page(s): Additional Operating Procedure and Parts Drawing

Addendum Information:

This addendum updates the Operation, Parts and Service Manual to include the parts drawing of the GKN road wheels for 2003 GMC Suburban trucks.

Please add the following drawing to the Operating, Service and Parts manual, and refer to this drawing for quantities required for installation and part numbers when ordering spare parts.



PARTS LIST

ITEM	PART NO.	PART DESCRIPTION	QTY/ASSEMBLY
1	R-075	19.5" X 6" WHEEL	5
2	R-2823	FRONT WHEEL SPACER (1/2" OFFSET)	2
3	R-2426	FRONT TURNING STOP BLOCK	2
4	R-078	90° TAPER LUG NUT	32
5	R-085	FRONT WHEEL STUD	16
6	R-092	REAR WHEEL STUD	16
7	R-2823A	REAR WHEEL SPACER (3/4" OFFSET)	2
8	S-001015A	WHEEL NUT TORQUE 140 FT-LBS. DECAL	5
9	-	19.5" TIRE (NOT SUPPLIED)	5

-IDENTICAL FASTENERS ARE NOT SHOWN FOR CLARITY

-GKN WHEELS ARE STAMPED WITH "GKN" ON THE FRONT FACE

MANUFACTURING NOTES:

WEIGHT (LBS):

VEHICLE APPLICATION					
YR	MAKE	MODEL	YR	MAKE	MODEL
03	GMC	C25906			
03	GMC	K25906			

REVISION			
REV	CHANGE	DATE	APR

RAFNA INDUSTRIES LTD.
19300 CLARK-GRAHAM
BAIE D'URFE, QUEBEC
(514) 457-4373

DESCRIPTION: TRUCK WHEEL MODIFICATION ASSEMBLY	
REFERENCE: 2003 GMC SUBURBAN	
MAT'L:	
P/N:	DATE: MAY 18, 2003
DRAWN: EDo	APPR:
DIM: INCHES	SCALE:
SHEET: 1 OF 1	DWG: MO25RRG-9A

Rafna Industries Limited

A Global Railway Industries Company

Form MA-0

ADDENDUM TO OPERATING, PARTS & SERVICE MANUAL

MA #: MO25XX -0-MA03

Date: November 9, 2001

Affected Manual / Railgear

Railgear Model: R-250HD VF/RF/RR

Manual #:

Affected Page(s):

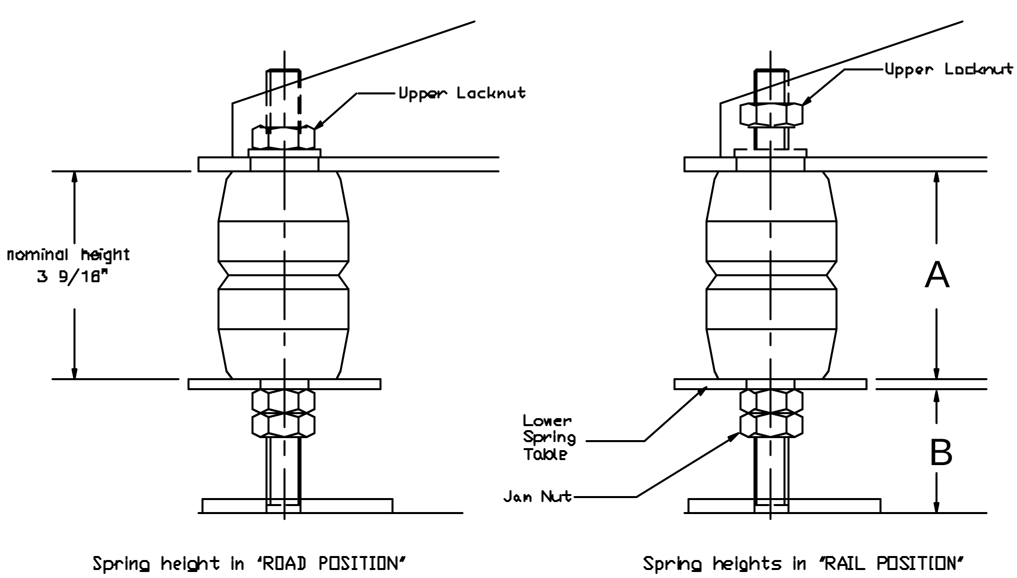
Addendum Information:

The Rafna Rubber covered wheel replaces the Rafna steel wheels. Both the steel wheels and the rubber covered wheels can be used interchangeably on the railgear with minor work and an alignment.

Adjust wheel pressures in accordance with the following instructions:

Note: Railwheel weights in excess of 700 lbs. will dramatically shorten the life of the rubber tread, and will cause premature failure.

Railwheel weights less than 500 lbs. may cause derailment.



Weight on railwheel (Lbs.)	A (inch)
500	2 7/8
550	2 13/16
600	2 3/4
650	2 11/16
700	2 5/8

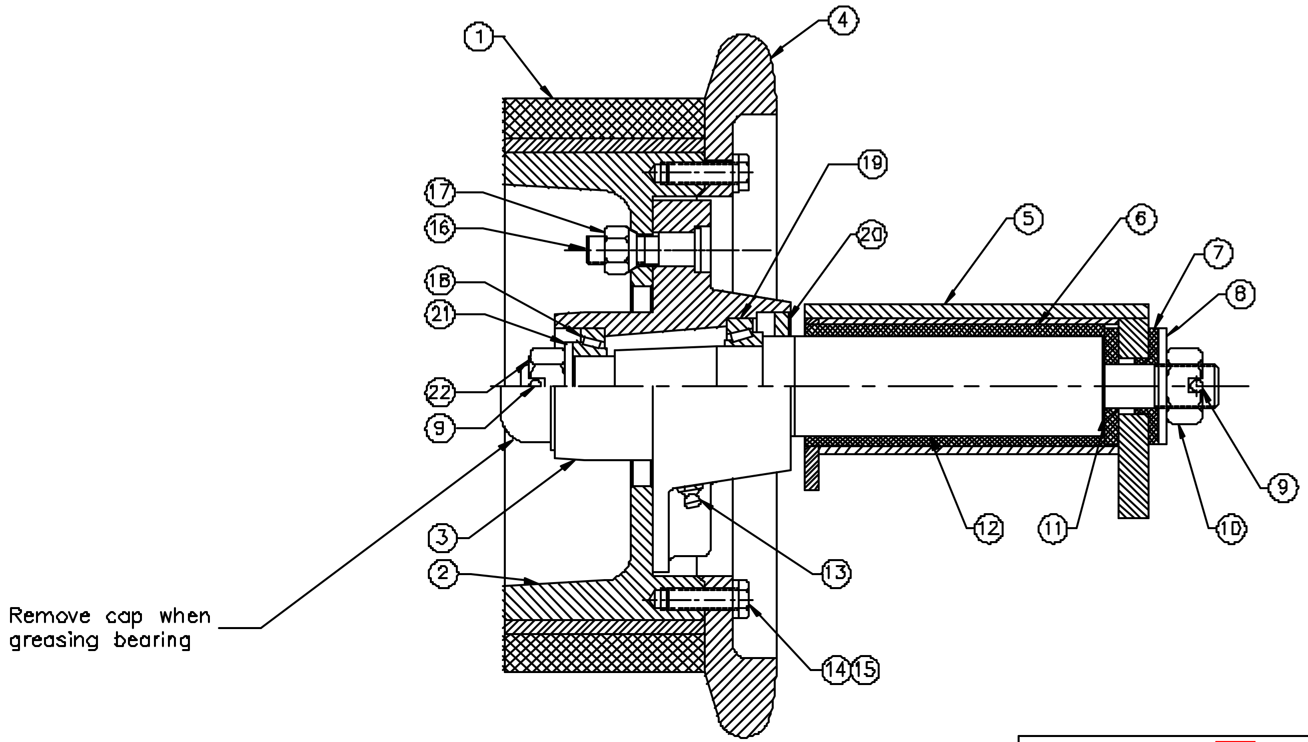
A. With the railgear in "on-road" position, adjust the upper locknut so the overall spring height is 3 9/16". This will allow the railgear to have maximum spring travel.
B. When "on-rail" loosen the jam nut and adjust the spring height so it does not exceed 700lbs. (2 5/8"). Ideally with the truck unloaded, set the weight to 500 lbs. this will allow for increased railwheel loads as the truck is loaded with gear, or as the truck's spring age.
   Do not exceed the recommended 700 lb. Load.
C. Ensure the distance (B) between the underside of the spring plate and the top of the lower axle is between 2 1/4" and 3". If this distance cannot be attained, the railgear will have to be repositioned.
D. Retighten the jam nut.
E. When going back "on-road" ensure the spring is only slightly compressed (i.e., the original nominal height of 3 9/16" is not exceeded). If the spring is loose (the original nominal height is greater than 3 9/16") tighten the upper locknut.
F. Recheck and repeat for other wheels.
G. This procedure **MUST** be repeated whenever the load is changed in the vehicle.

MAINTENANCE:

1. A grease fitting is provided on the back of the wheel. Time interval for greasing should be in accordance with the "Operating, Maintenance and Parts Manual".
   When greasing the bearing remove the dust/grease cap to prevent damage to the grease seal.
2. Adjust bearing endplay in accordance with the "Operating, Maintenance and Parts Manual".
3. To replace the rubber sleeve:
   A. Unbolt the wheel from the hub (item 17), then unbolt the flange from the wheel (item 14).
   B. With a suitable press, press off the sleeve.
   C. Press on a new sleeve.
   D. Ensure the sleeve is flush with the "flange" edge of the wheel.
4. Reinstall flange with new hardware (item 14, 15), tighten to 40 ft-lbs.
5. Reinstall wheel to hub, tightening bolts (item 17) to 100 ft-lbs.
6. Verify bolt torque every 625 rail miles (1000 kms).

Rafna Industries Limited

A Global Railway Industries Company



BILL OF MATERIALS

ITEM	PART NO.	DESCRIPTION OF ITEM (PART)	QUANTITY	ITEM	PART NO.	DESCRIPTION OF ITEM (PART)	QUANTITY
1	S-201001	10" SLEEVE FOR RUBBER WHEEL	1	13	–	1/8" NPT GREASE FITTING	1
2	S-201002	10" TREAD FOR RUBBER WHEEL	1	14	–	3/8" UNC GR.8 BOLT x 1.250" LONG	8
3	S-201100	HUB	1	15	–	3/8" LOCKWASHER	8
4	S-201003	10" FLANGE FOR RUBBER WHEEL	1	16	S-201130	WHEEL STUD	5
5	R-1593	SPINDLE HOUSING ASSEMBLY	1	17	S-201160	WHEEL NUT	5
6	R-1603A	SPINDLE INSULATOR	1	18	S-201300	OUTER BEARING SET	1
7	R-005	DIELECTRIC INSULATING BUSHING	1	19	S-201360	INNER BEARING SET	1
8	–	3/4" SAE FLAT WASHER	1	20	S-201302	GREASE SEAL	1
9	–	COTTER PIN 3/16" x 2"	1	21	S-201230	SPINDLE WASHER	1
10	R-016	3/4" – 16 UNF SLOTTED NUT	1	22	S-201260	SPINDLE NUT	1
11	R-2872	INSULATOR WASHER	1	23	R-2876	SPARE WHEEL (ITEM #'S 1,2,4,14,15)	1
12	S-201200	SPINDLE	1				

RAFNA INDUSTRIES LIMITED

A Global Railway Industries Company

19300 Clark Graham, Baie D'Urfe, Quebec Canada H9X-3R8

TITLE

10" Rubber Tread Wheel
R-250 HD

CUST. DWG NO.

DRAWN BY

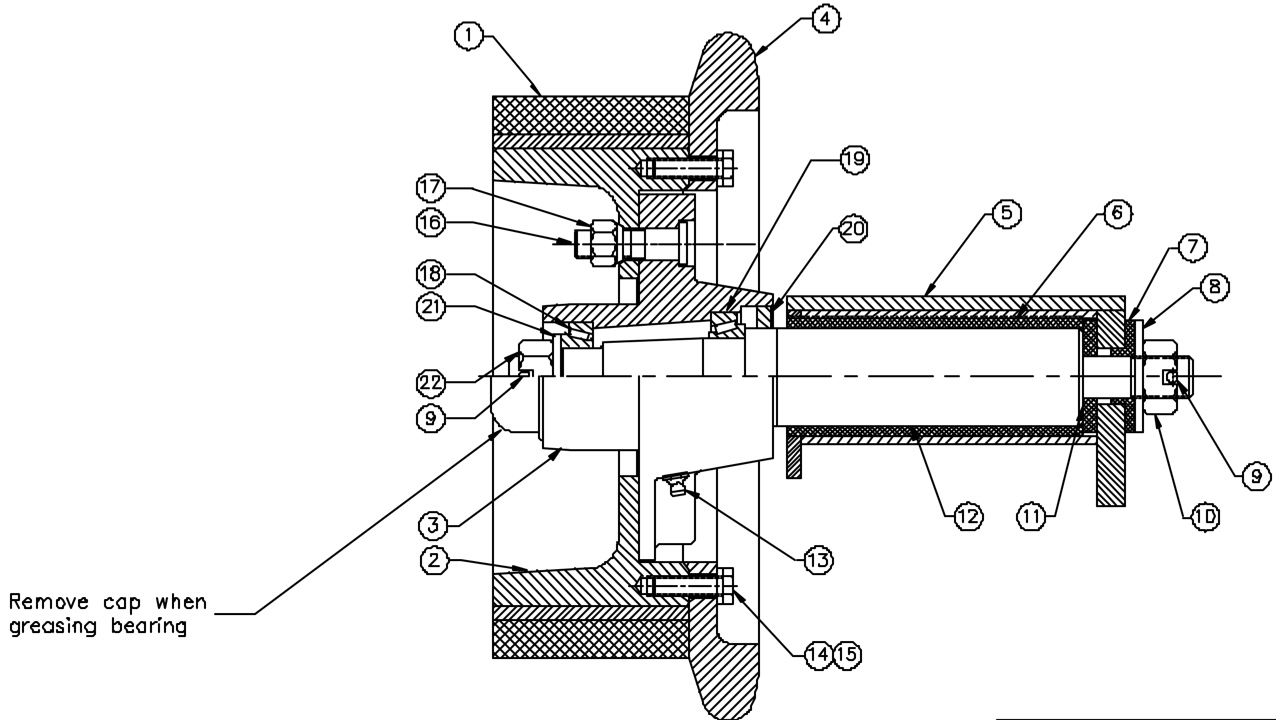
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REV. 0

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Rafna Industries Limited

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BILL OF MATERIALS

ITEM	PART NO.	DESCRIPTION OF ITEM (PART)	QUANTITY	ITEM	PART NO.	DESCRIPTION OF ITEM (PART)	QUANTITY
1	S-201001	10" SLEEVE FOR RUBBER WHEEL	1	13	–	1/8" NPT GREASE FITTING	1
2	S-201002	10" TREAD FOR RUBBER WHEEL	1	14	–	3/8" UNC GR.8 BOLT x 1.250" LONG	8
3	S-201100	HUB	1	15	–	3/8" LOCKWASHER	8
4	S-201003	10" FLANGE FOR RUBBER WHEEL	1	16	S-201130	WHEEL STUD	5
5	R-1583	SPINDLE HOUSING ASSEMBLY	1	17	S-201160	WHEEL NUT	5
6	R-1603A	SPINDLE INSULATOR	1	18	S-201300	OUTER BEARING SET	1
7	R-005	DIELECTRIC INSULATING BUSHING	1	19	S-201360	INNER BEARING SET	1
8	–	3/4" SAE FLAT WASHER	1	20	S-201302	GREASE SEAL	1
9	–	COTTER PIN 3/16" x 2"	1	21	S-201230	SPINDLE WASHER	1
10	R-018	3/4" – 16 UNF SLOTTED NUT	1	22	S-201260	SPINDLE NUT	1
11	R-2872	INSULATOR WASHER	1	23	R-2876	SPARE WHEEL (ITEM #'S 1,2,4,14,15)	1
12	S-201200	SPINDLE	1				

RAFNA INDUSTRIES LIMITED

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19300 Clark Graham, Baie D'Urfe, Quebec Canada H9X-3R8

TITLE

10" Rubber Tread Wheel
R-250 HD

CUST. DWG NO.	DRAWN BY

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